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ARGENTINA: GROWTH POTENTIAL OF THE GRAIN AND LIVESTOCK SECTORS



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ABSTRACT

The study evaluates Argentina's potential production of grain and livestock by 1975 under alternative price levels. Resource availability and possible technological innovations were considered in each projection. Argentina will have record export availabilities of corn and sorghum in 1975 and near-recent levels of wheat and beef, assuming a continuation of real 1970 price levels. Exports of the small grains barley, rye, and oats will be minimal. Production of sorghum and corn will expand more rapidly than that of wheat or beef. Wheat will continue to be grown in preference to the other small grains. Beef production will fluctuate cyclically, dropping to a low level in 1971 and 1972 and hitting a peak around 1974. A lower grain price than 1970's would raise beef production and exports, and reduce grain exports.

Should the extremely high beef prices reached in Argentina in 1971 establish a new price pattern, and the Government succeed in restraining domestic consumption, beef exports could be near 1 million tons. Exports in the late 1960's averaged 650,000 tons.

KEY WORDS: Argentina, wheat, corn, sorghum, grains, beef, agricultural production, supply response, 1975.

Metric measurements are used throughout this report unless otherwise noted. In tables, n.a. means not available.

FOREWORD

This study evaluates the probable production potential of Argentina's grain and livestock sectors by 1975. Similar studies have been made on Australia and Canada. The three studies were conducted by teams of economists under the leadership of William R. Gasser, Chief of the Developed Countries Branch, Foreign Demand and Competition Division, ERS. They present a picture of trends and changes (both past and projected) in the production and trade of three of the world's major agricultural exporters, and identify the major causes of the changes.



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SUMMARY

Argentina will export around 700,000 tons of beef in 1975, if world beef consumption remains strong and Argentine prices relax from 1971's exceptional peak levels. The Argentine Government would need to continue to balance exports against customarily heavy domestic consumption to achieve this level. Argentine beef exports amounted to 650,000 tons in 1970 and averaged 660,000 tons during 1966-70.

The export level could go even higher--to over 1 million tons by 1974 or 1975--if world beef consumption becomes exceptionally strong, supporting a continuation of 1971's high prices and establishing a new price level. For this export level, however, the Government would need to substantially reduce domestic consumption. The 700,000-ton projection is more likely.

Additional price assumptions were used to project Argentina's 1975 output and exports of beef and grain. If farm and world prices remain at 1970 levels for both beef and grain, beef production increases to 2.64 million tons in 1975, from 2.61 million in 1970. Beef exports would be 630,000 tons, which is below the 1966-70 average.

If 1970's grain prices drop 15 percent and beef prices remain constant, beef production rises to 2.76 million tons. This is 4.5 percent above the level projected under the assumption of no change in 1970's grain prices. The increase occurs partly because lower grain prices would cause expansion of improved pastures and use of more grains for forage. Under the lower grain price assumption, beef exports rise to a record 750,000 tons--19 percent more than under the alternative assumption.

Resource availability and possible technological innovations were taken into account throughout the evaluation. Also, the beef production cycle was analyzed and allowed for in all the beef projections. Under all projections beef production peaks around 1974, with 1975 levels on the down slope of the cycle. This represents a continuation of the pronounced 6-year cyclical path evident in 1950-70 for beef production, consumption, and exports. The cycle implies a 3-year lag for production to adjust to price movements. Prices in 1972 would therefore influence 1975 production most heavily.

Grain production increases in 1975, if 1970 grain and beef prices do not change--even though 1970 Argentine prices for grain were abnormally low. The increases are due to nonprice factors--limited expanded area, better management, and the need for a cash crop and an emergency pasture for the beef operation.

Wheat production rises to 7.6 million tons in 1975 under the constant-price assumption, up from 7.0 million in 1970. The increase results from expanded planted area--6.7 million hectares in 1975 (80 percent harvested) versus 6.2 million in 1970--and slightly increased yields--1.40 tons per hectare versus 1970's 1.35 tons.

Corn production increases from 9.4 million tons to 10.2 million, as a result of increased area planted and increased yields. In 1975, area planted is 5.0 million hectares, compared with 4.7 million in 1970. Yields rise from 2.3 tons per hectare to 2.4 tons.

Sorghum production increases greatly--from 3.8 million tons in 1970 to 5.1 million in 1975--because of expanded area planted. The 1975 area is 3.4 million hectares (75 percent harvested), compared with 2.6 million in 1970. Yields remain at 2 tons per hectare, because sorghum is being expanded to drier, marginal lands.

Grain production in 1975 drops from the above levels under the second price assumption--that 1970 grain prices decline 15 percent and beef prices remain constant.

Wheat production falls 21 percent, to 6.0 million tons, a level moderately below the late 1960's average. Corn production of 9.2 million tons in 1975 is 10 percent lower than the projection with constant 1970 prices. Sorghum production is 4.7 million tons, 8 percent below the alternative 1975 level.

Grain export availabilities in 1975 are projected as follows:

If 1970 grain prices prevail, wheat exports are 3.3 million tons, about the 1965-69 average. Only 1.7 million tons are available for export if grain prices drop 15 percent--a 48-percent decrease from the alternative projection.

Corn exports reach 6.6 million tons, a recent record, if 1970 prices prevail. If grain prices drop 15 percent, 1975 exports are 5.3 million tons--20 percent less than under the alternative assumption.

Sorghum's 1975 export availability is 3.2 million tons under the constant-price assumption. This decreases 22 percent, to 2.5 million tons, with lower prices.

Additional highlights of the study include the following:

* A high degree of complementarity between grains and cattle was apparent. In the Pampa region, producers largely operate joint grain-livestock enterprises. This combination tends to reduce producers' risks because grain serves as both a cash crop and an emergency pasture. In normal weather, producers harvest most of the grain area for grain. During droughts, they use wheat and other small grains as extra pasture in the spring. In the fall, corn and sorghum serve this purpose. Such complementarity does not extend to other crops such as sunflower, flaxseed, and peanuts.

* Nonprice factors seem to be more important than prices, or they hide price effects, in producers' production plans. Although it is assumed that producers adjust their plans according to relative price changes, statistical measurement of such adjustment in Argentina was inconclusive for both beef and grain. Cross-price responses for the two also could not be measured. Weather, especially too much or too little rain and late spring or early fall frosts, is one nonprice factor which drastically influences planting and harvesting decisions as well as cattle marketings. The need to maintain minimum emergency forage for a given number of cattle over a possible drought period ensures that some grains will be planted with little regard to price. Domestic and international market uncertainties, coupled with changes in Government policies, in export taxes, and in foreign exchange rates, further obscure producers' reactions to price changes.

* The Pampa will continue to be the center of crop and livestock production. This region produces over 90 percent of Argentina's grain and oilseeds and about 80 percent of the livestock. Within the Pampa, corn production will increase in south-eastern Buenos Aires Province, perhaps at the expense of wheat and potatoes. Sorghum grain will expand outside the region. Most expansion will be in the western Provinces, since sorghum is the grain most adaptable to the drier climate and poor soil there.

* Although no projections were made for barley, oats, and rye, analysis of past trends shows production of 1.2 million to 1.6 million tons in 1975 if trends continue. Production in 1970 was 1.4 million tons. Yields and area will change little.

* No major breakthroughs in agricultural technology are expected for Argentina through 1975. No significant quantities of new land will be brought under cultivation. Although full utilization of technology and land now available could increase production far above projected levels, such intensive use is not anticipated.

During 1950-70, Argentina's grain and livestock economy showed the following trends:

* Total cultivated area under crops and forages increased 0.8 percent a year and is close to 30 million hectares. In the late 1960's, the share for harvested grains averaged 42 percent, and forages, 24 percent. Grains not harvested but used as forage averaged 19 percent, oilseeds 9 percent, and fruits, vegetables, sugarcane, hemp, tobacco, and other crops, 6 percent of the total cultivated area.

* Production of sorghum grain and corn increased; barley, rye, and oats decreased; and wheat fluctuated widely, with no discernable trend. Yields generally increased for corn and sorghum but declined for other grains. Sorghum production increased as a result of dramatic increases in area planted. Its domestic consumption also increased spectacularly. Sorghum's high potential in marginal areas and its use, along with other grains, as a risk-reducing crop in cattle production account for its success. Corn production increased rapidly because of expanded area and increased yields in response to favorable prices. Wheat production, burdened by poor prospects on the international market, was maintained as a result of price supports plus producers' need for a spring cash crop and emergency pasture. Returns for wheat are significantly higher than returns for other small grains.

* Meat production increased nearly 1.9 percent a year over the two decades. Production of mutton, lamb, and pork increased slightly faster than beef production, but beef still accounts for 84 percent of Argentina's total meat production. Production increases have been due to expansion of grazing lands and improvement of pastures in the Pampa. In general, however, improvement in the carrying capacity of pastures has been slow.

* Area planted to oilseeds (flax, sunflower, and peanuts) decreased during the 1960's by about 300,000 hectares and their yields did not improve. Although their prices remained favorable, oilseeds do not serve as emergency pasture as the grains do--a disadvantage in combined grain-livestock operations. Sunflower, being a second crop following wheat, seems to be in a better competitive position than flax or peanuts.

ARGENTINA: GROWTH POTENTIAL OF THE GRAIN AND LIVESTOCK SECTORS

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I. INTRODUCTION

Purpose

The purpose of this study is to determine the growth potential of Argentina's grain and livestock industries through 1975. The study (1) investigates patterns and trends in Argentina's foreign trade; (2) identifies recent changes in the country's production volume and patterns; (3) determines some of the causes of these changes; (4) examines the influence of Government policies and major marketing institutions on production; (5) determines supply response relationships to prices; (6) examines the potential for changes in technology, management, inputs, and the location of production; and (7) determines potential production and export availabilities through 1975, under alternative price assumptions.

This study relies on research results from many sources, supplemented by an updating of data and some original research. Domestic consumption and foreign demand are largely taken as predetermined at assumed price levels. Given these price levels and assuming an unlimited demand in the foreign market, the study presents several alternative production potentials.

Importance of Agriculture

In the late 1960's, agriculture accounted for 14 to 16 percent of Argentina's gross domestic product (GDP) and 85 to 93 percent of total exports (table 1). The rural population is about 25 percent of the total population (1971) (33, table 2.11). 1/

Crop production accounted for 9 to 10 percent of GDP in the late 1960's, and livestock production for 6 to 7 percent. Beef, milk, corn, and wheat are the most important commodities in terms of value (23). Wheat exports during 1965-69 accounted for 9 to 27 percent of agricultural exports, coarse grains 15 to 20 percent, fresh beef 13 to 17 percent, and processed meat 4 to 11 percent. 2/

1/ Underscored numbers in parentheses refer to materials in Literature Cited, at the end of this report.

2/ More detail on historical production and trade patterns is given in chs. II and III. See also Smith (63) and Fienup, Brannon, and Fender (24) for a detailed review of Argentina's agricultural economy.

Table 1.--Agriculture and agricultural trade in the Argentine economy, 1965-69

Year	: Agr. GDP : as a per- : cent of : total GDP : <u>1/</u>	: Agr. exports : as a percent : of total : exports	: Wheat and : flour ex- : ports as a : percent of : agr. exports:	: Coarse grain: : exports as a : percent of : agr. exports: : <u>2/</u>	: Beef exports, : fresh, frozen, : or chilled : As a percent of agr. exports	: Processed : meat : <u>3/</u>
1965	16.0	92.8	26.8	14.6	16.6	4.2
1966	15.3	91.7	19.1	17.6	16.4	5.9
1967	15.6	89.7	9.2	20.4	15.3	8.4
1968	14.3	85.2	11.9	16.6	12.7	10.9
1969	13.8	85.1	10.5	20.3	17.6	10.0

1/ At factor costs in 1960 prices. 2/ Includes corn, barley, oats, rye, other unmilled cereals. 3/ Includes dried, salted, and smoked meat; meat extracts and juices and prepared and preserved meat.

Sources: For GDP, (6); for trade, computed from data presented in table 4, and App. tables 1 and 2.

Table 2.--Argentine share of world exports of selected agricultural commodities, averages 1950-69, annual 1965-69

Year	: Wheat : and : flour	: Corn	: Oats	: Barley	: Beef : <u>1/</u>	: Mutton, : lamb, and : goat meat: : <u>1/</u>	: Pork : <u>1/</u>	: Meat, dried, : salted, or : smoked	: Canned : meat : NES <u>2/</u>
	Percent								
1950-54	10.2	20.4	11.5	6.5	26.2	11.7	11.9	n.a.	n.a.
1955-59	9.7	16.6	18.9	6.7	37.2	11.9	14.4	n.a.	n.a.
1960-64	5.8	14.6	22.6	3.6	29.7	6.6	2.7	1.0	13.2
1965-69	7.3	13.4	17.5	2.6	22.2	6.7	1.1	.7	13.4
1965	13.3	11.2	20.1	3.7	24.1	4.9	.3	.7	7.8
1966	8.1	14.7	8.1	1.8	26.9	8.3	3.4	.7	10.5
1967	3.9	15.9	16.4	.9	23.8	9.6	1.8	.9	14.5
1968	4.6	10.1	30.5	2.9	15.5	5.5	.2	.6	16.1
1969	6.3	15.0	13.7	3.6	21.8	5.6	.2	.6	17.0

1/ Fresh, chilled, or frozen. 2/ Meat in airtight containers not elsewhere specified and meat preparations, whether or not in airtight containers.

Sources: For 1950-65, computed from data in (33), tables 5.1 and 5.3. For 1966-1969, computed from data in (27). Both series are computed from quantity rather than value figures.

Argentina is an important agricultural exporter and a major competitor with the United States in certain commodities. In 1965-69, Argentina supplied 22 percent of world exports of fresh, chilled, or frozen beef and veal and 13 percent of the canned meat (table 2). Similar percentages of world exports supplied by Argentina are 13 for corn, 7 for wheat and flour, 18 for oats, 3 for barley, and 7 for fresh, chilled, or frozen mutton, lamb, and goat meat. Exports of hides and skins, linseed oil, oilseed cake and meal, milling byproducts, dairy products, and deciduous fruits are also important in world markets.

The more important commodities in which Argentina competes with the United States in world markets are wheat, corn, sorghum, vegetable oils, variety meats, apples, pears, and cattle hides. In addition, Argentina supplies a major portion of U.S. cooked beef imports; Argentine shipments accounted for about 11 percent of all U.S. beef imports in 1969. Because of U.S. sanitary restrictions on the entry of fresh meats, Western Europe is the major market for Argentina's fresh, chilled, or frozen beef exports.

II. PATTERNS AND TRENDS OF MAJOR AGRICULTURAL EXPORTS, 1960-69

Importance of Agricultural Exports

Total Argentine exports increased during the 1960's, reaching a peak of \$1.6 billion in 1969 (app. table 1). Agricultural exports have declined as a percentage of total exports over the decade, fluctuating from 98 to 85 percent.

The most important agricultural exports are cereals, meats, natural fibers, and animal feeds. Wheat, corn, sorghum, and beef are the more important commodities. In 1969, wheat accounted for 10 percent of agricultural exports; coarse grains 20 percent; fresh, frozen, or chilled beef 17 percent; and processed meat (largely beef) 8 percent.

Major Argentine agricultural export markets are in the developed world, which took 70 percent of exports during 1964-69 (table 3). ^{3/} Central plan countries accounted for 10 percent and less developed countries, 18 percent. European Common Market countries took 42 percent of the exports, with Italy and the Netherlands accounting for well over half. The European Free Trade Association (largely the United Kingdom) imported 13 percent and the United States almost 7 percent. Brazil took about half of Argentina's exports to countries in the Latin American Free Trade Association (LAFTA). LAFTA has been growing in importance in recent years as a market for Argentine exports.

Grains

Exports of grains and preparations declined during 1965-69 but provided \$346 million to \$580 million in foreign exchange during these years (app. table 2). Wheat and flour exports were dominant in the early part of the period, but by 1967 the value of corn exports equaled or exceeded that of wheat. Exports of sorghum are growing rapidly. In recent years, almost half the wheat and sorghum and over half the corn

^{3/} Table 3 shows countries grouped as follows: Developed, Central Plan, or Less Developed.

Table 3.--Value of Argentina's agricultural exports by major country or regional destination, 1964-69

Country or region	1964	1965	1966	1967	1968	1969
	<u>Million dollars</u>					
United States . . .	72.5	75.7	101.6	94.5	116.2	102.7
Canada	2.1	1.8	2.3	3.1	3.1	5.8
Japan	38.1	30.8	35.9	32.3	27.2	69.4
EC	591.4	589.2	586.3	591.3	484.8	551.7
Belg.-Lux. . . .	52.3	47.5	54.1	60.6	58.7	52.3
France	63.2	52.9	42.4	49.5	41.2	53.3
West Germany (Fed. Rep.)	106.2	95.3	82.5	75.6	62.4	65.2
Italy	235.9	234.3	257.0	223.0	191.3	216.4
Netherlands	133.8	159.1	150.2	182.6	131.2	164.5
EFTA	188.9	185.5	179.6	166.6	122.5	180.2
United Kingdom . .	151.2	148.8	148.5	133.6	99.2	149.9
Other W. Europe . . .	32.3	74.1	107.8	119.5	91.7	112.8
Australia & N.Z. . .	.3	.1	.2	.2	.4	.2
South Africa	1.3	1.2	4.2	1.8	1.2	1.1
Total developed area	926.9	958.4	1,017.9	1,009.3	847.1	1,023.9
Eastern Europe . . .	56.9	31.9	59.2	50.2	33.3	46.1
USSR	14.8	87.0	92.9	18.5	15.7	19.3
Communist Asia . . .	91.9	83.2	84.9	6.2	.6	.1
Total central plan area	163.6	202.1	237.0	74.9	49.6	65.5
LAFTA	172.2	199.4	195.5	213.3	246.3	237.9
Brazil	89.2	100.8	88.1	87.6	110.4	107.3
Chile	28.8	42.8	41.3	51.8	50.4	54.8
CACM	1/	.1	1/	.1	.1	.7
Other Latin America .	11.0	5.7	3.0	3.9	5.4	6.1
Africa	2.6	6.6	1.4	7.2	3.4	7.8
West Asia	4.9	12.9	13.6	10.2	18.2	17.2
South Asia . . . . .	.1	.1	.1	.6	2.3	4.3
South East Asia . . .	1/	1/	1/	.8	.1	.4
Other East Asia . . .	6.4	3.4	3.3	4.0	5.7	6.4
Far East & Oceania . .	.6	.6	.5	1.6	.8	1.1
Total less developed area	197.8	228.8	217.4	241.7	282.3	281.9
World total	1,288.3	1,389.3	1,472.3	1,325.9	1,179.0	1,371.3

EC--European Community. EFTA--European Free Trade Association. LAFTA--Latin American Free Trade Association. CACM--Central American Common Market.

1/ Less than \$50,000.

Source: (74).

have been exported (table 4). The United Kingdom and the Netherlands are major markets for wheat, corn, and sorghum. Italy, Brazil, and Peru are significant importers of Argentine wheat. Other major importers of Argentine corn are Italy, Spain, Belgium-Luxembourg, and West Germany. Japan and Belgium-Luxembourg are major markets for sorghum (61, pp. 39-42).

Table 4.--Major Argentine exports as a percent of Argentine production, average 1950/51-1969/70, annual 1965/66-1970/71

[illegible]

1/ Based on production and trade of second year given; for example, 1950/51 figure is for 1951.

Source: Computed from app. tables 7, 8, and 9.

Beef

Beef is by far Argentina's most important meat export. Exports of pork, mutton, lamb, and goat meat are relatively small.

Argentina exports beef in three major forms: (1) Fresh beef that is chilled or frozen, (2) cooked beef that is canned or frozen, and (3) dried, salted, or smoked beef. Fresh beef exports are the most important, amounting to \$235 million in 1969, compared with about \$4 million for dried, salted, and smoked meat and \$132 million for prepared and preserved meats, and meat extracts and juices (app. table 3). Prepared and preserved meats are growing in importance.

About 25 percent of beef production (carcass weight equivalent) was exported in the 1960's (table 4). Major export markets for fresh beef are the United Kingdom, Italy, the Netherlands, and Spain, which together accounted for over 60 percent of 1968 exports. Canned meat goes largely to the United States and the United Kingdom, which collectively took 75 percent of 1968 exports. Argentine beef exported to the United States is canned or precooked cow beef, because U.S. sanitary regulations preclude imports of fresh, chilled, or frozen meats from countries where foot-and-mouth disease exists. Canned Argentine beef is processed from canner-type cattle. The precooked beef is processed from the best muscle cuts of canner-type cattle and, in some instances, from similar cuts of better quality cow beef. There are two kinds of

precooked beef. The first is shipped in bulk containers for further cooking in the United States before consumption. The second is precooked beef, generally quick frozen after cooking, which can be consumed without further cooking. The precooked, quick-frozen beef generally is used in TV dinners, beef potpies, beef stew, canned soups, and mixtures of beef and vegetables (46, p. 8).

III. MAJOR PRODUCTION PATTERNS AND TRENDS, 1960-70

Major Agricultural Zones

Physical Setting

Argentina is about one-third the size of the continental United States. It has a variety of climates from subtropical to cold, but most of the country lies in the Temperate Zone, where climate and soils resemble those of the United States between the Mississippi River and the Rocky Mountains. Rainfall is adequate and often abundant in the northeastern part of the country but diminishes in the west. The Andean foothills are almost completely arid. About 24 percent of the country is humid, 15 percent semi-arid, and 61 percent arid (maps 1 and 2).

Argentina can be roughly divided into six production regions--Pampa, Northeast, North, Northwest, Cuyo, and Patagonia (map 3). However, to facilitate analysis and because of the available data, regional limits in this study coincide with Provincial boundaries.

Main Production Regions 4/

The Pampa region is a vast, originally treeless, lowland prairie with mild climate and regular rains in the east. It has no major rivers. Because of poor surface drainage, abundant rains occasionally create large shallow lakes. Annual rainfall averages 38 inches at the region's eastern edge and decreases to 20 inches at its western limit. Hence, the Pampa is often divided into a humid and a semiarid section. In the northern part, January temperatures average 66° F. to 79° F. and July temperatures, 25° F. to 45° F. The soil of most of the Pampa is deep, black, friable chernozem, except for sandy steppe loam in western Cordoba, La Pampa, and southwestern Buenos Aires Provinces.

The temperate climate, adequate moisture, and good soil make the Pampa the agricultural heartland of Argentina. Excluding the Federal District, it contains over 50 percent of the country's population (70 percent if the Federal District is included), nearly 80 percent of total cattle numbers, nearly 90 percent of hogs, and 48 percent of sheep. It produces over 90 percent of the country's grains and oilseeds.

The Northeast region lies between the Parana and Uruguay Rivers. It generally is a rolling plain still largely forested. Soils are mainly alluvial in the Parana flood plains but red, leached, and acid elsewhere. Rainfall is evenly distributed throughout the year, averaging 57 inches in Corrientes Province and 65 inches in Misiones Province. January temperature is about 80° F. July temperature is about 60° F. with occasional

4/ Based on (63), (13), and (55).

ARGENTINA: PHYSICAL

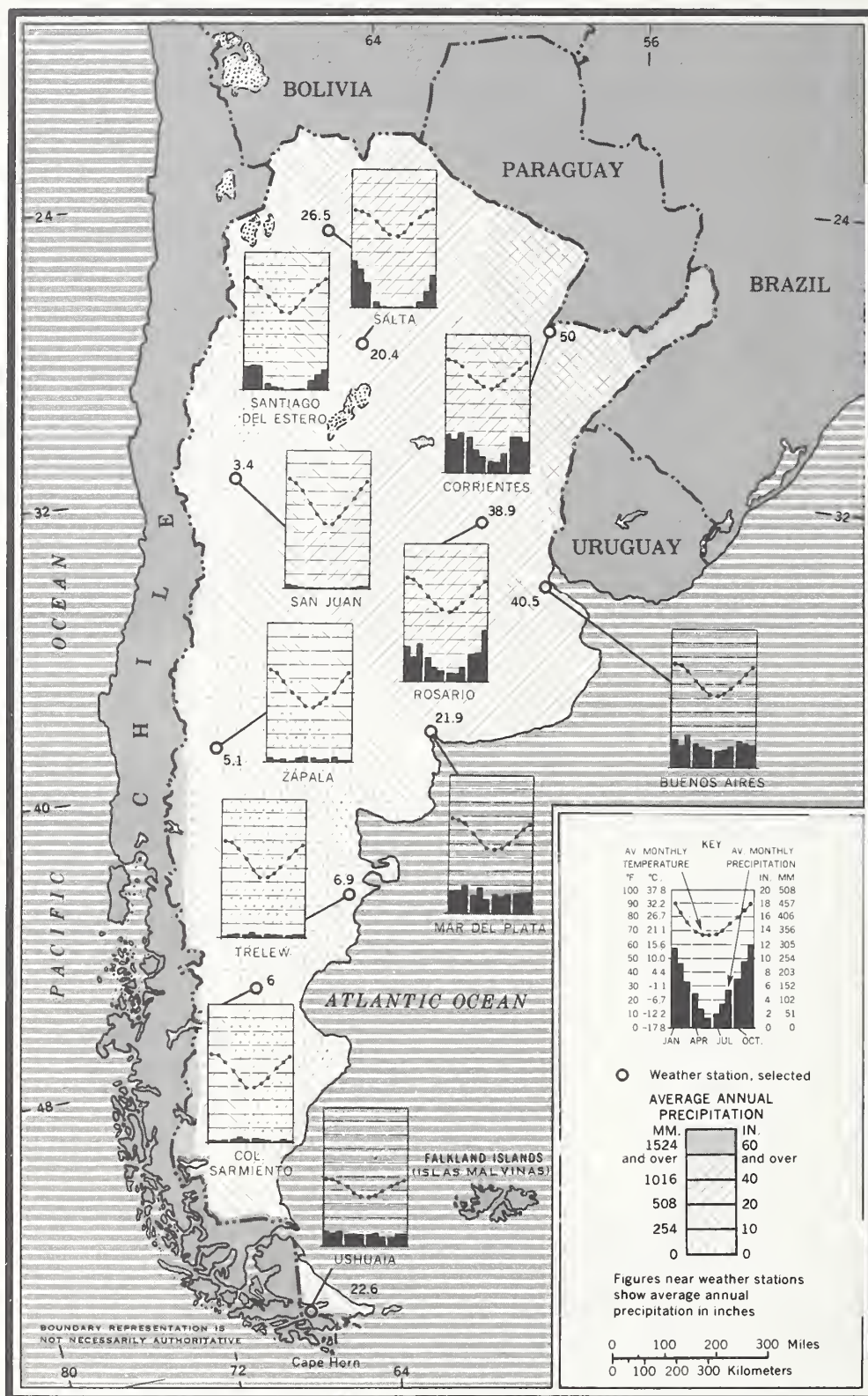


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Map 1

ARGENTINA: PRECIPITATION



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Map 2



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Map 3

frosts. Misiones produces tung nuts, yerba mate, bananas, pineapples, and citrus fruit. Corrientes produces citrus fruit, rice, tobacco, and cotton, and cattle and sheep are grazed there. About 5 percent of the country's population lives in the Northeast.

The North region, also known as the Chaco region, is a vast, wooded lowland plain extending from western Paraguay and eastern Bolivia. It is subtropical with high temperatures; the average is 82° F. in January and 62° F. in July. Rainfall averages 62 inches in the east and 22 inches in the west, with greatest accumulation in the summer months. Soils are alluvial along the Paraguay and Parana Rivers; predominantly red soils are found elsewhere. The region is still covered by large forests. Cotton and quebracho wood are its chief products, but bananas and pineapples are important in eastern Formosa Province. Large numbers of native cattle with some Zebu breeding are raised in the region, since heat and insects make other breeds uneconomical. A little over 4 percent of the Argentine population lives in the North.

The Northwest region is largely an arid tableland. The soils are mainly shallow lithosols, the exceptions being chestnut and brown soils of Santiago del Estero and Tucuman Provinces. Average annual rainfall is 37 inches in Santiago del Estero and Tucuman and less than 14 inches elsewhere. January temperatures average 70° F. in Jujuy Province and 83° F. in Catamarca Province; the region's July temperature averages about 50° F. Rainfall patterns in Tucuman and, to a lesser extent, Salta and Jujuy, allow cultivation of sugarcane and citrus fruit. Jujuy and Salta also grow tobacco. Santiago del Estero leads in squash and watermelon production and Catamarca and La Rioja are important in grape production. About 12 percent of the Argentine population lives in the six Provinces of the Northwest, nearly one-third of them in Tucuman.

The Cuyo region is an extension of the northwestern arid tableland. The soils are lithosols in the Andean highlands and most of San Juan Province, and sierozem on the eastern limit of the region. Annual rainfall ranges from 4 inches in the Andean foothills in San Juan and Mendoza Provinces to 23 inches in San Luis Province. January temperatures average 75° F. and July temperatures about 46° F. Extensive irrigation has made Mendoza and San Juan the center of the Argentine wine and food-processing industries. Mendoza is the principal producer of grapes, plums, cherries, apricots, and olives, and San Juan and San Luis are leading growers of deciduous fruit. Alfalfa (for fattening cattle) and vegetables are also grown in mountain valleys. About 7 percent of the country's population lives in the Cuyo region.

The Patagonia region extends from Rio Colorado to Tierra del Fuego, including the Provinces of Neuquen, Rio Negro, Chubut, and Santa Cruz, and the territory of Tierra del Fuego. It is mainly a semiarid, windy plateau, separated by deep lateral and waterless canyons. Annual rainfall averages about 13 inches in the northeast and 23 inches in Tierra del Fuego, but only 7 inches in most of the plateau. January temperature is about 49° F. in the extreme south and 71° F. in the north. The soils are mostly sierozems in the northeast, lithosols in the Andean highlands, and chestnut and brown in western Chubut and southwestern Santa Cruz. Because of the region's short growing season and lack of moisture, sheep are the only animals grazed. In the north, however, the irrigated valleys of Rio Negro and Rio Colorado are important fruit producers, accounting for most of Argentina's apple and pear production. Less than 3 percent of the country's population lives in Patagonia.

Land Tenure System

Early colonial and national land policies produced Argentina's present land tenure pattern, which is dominated by large holdings employing hired labor, rather than family-type operations. At the other extreme, particularly in the Chaco region, there are uneconomically small farm units and rural workers without land (53, p. 105;

24, p. 30). In 1960, farms up to 25 hectares accounted for 38 percent of all farms but for only 1 percent of the total area in farms. In contrast, the 6 percent of farms over 1,000 hectares in size controlled over 74 percent of the total area (table 5).

Table 5.--Farms, area in farms, and distribution by farm size, Pampa and total Argentina, 1960

Farm size	Farms			Area in farms		
	Pampa	Other regions	Total	Pampa	Other regions	Total
	-----Thousands-----			---Million hectares---		
Up to 25 hectares	55.3	126.1	181.4	0.6	1.1	1.8
25.1 to 200 hectares	132.6	53.6	186.3	12.4	4.1	16.5
200.1 to 1,000 hectares	49.2	14.0	63.2	19.7	6.8	26.5
Over 1,000 hectares	11.2	15.2	26.4	34.9	95.4	130.3
Unknown size	3.0	11.7	14.6	n.a.	n.a.	n.a.
Total 1/	251.2	220.6	471.8	67.7	107.6	175.1
	Percent					
Up to 25 hectares	22.0	57.2	38.4	1.0	1.0	1.0
25.1 to 200 hectares	52.8	24.3	39.5	18.3	3.8	9.4
200.1 to 1,000 hectares	19.6	6.3	13.4	29.1	6.4	15.2
Over 1,000 hectares	4.4	6.9	5.6	51.6	88.8	74.4
Unknown size	1.2	5.3	3.1	n.a.	n.a.	n.a.
Total	100.0	100.0	100.0	100.0	100.0	100.0

1/ Total area in farms does not include land belonging to 14,583 farms whose area was not reported in the 1960 census of agriculture.

Source: (21, 1960, pp. 4-5).

Some large landholdings are operated by tenants and sharecroppers, but this form of operation is on the decline. The tenants' and sharecroppers' contractual arrangements with the landowner are regulated, mainly in regard to duration of the contract and indemnification to the tenant for his investment in property. Present law limits the length of the contract to 5 to 10 years, at the end of which the landowner must indemnify the tenant up to a maximum of 20 percent of the assessed tax value of the rented area. Because this limit appears low to tenants, they are reluctant to invest more than the essential minimum required for housing and farm operations (34). Moreover, the temporary nature of numerous official contract extensions has made the arrangement uncertain for both tenants and landlords. This makes long-range planning and productive investment in improved technology difficult. Occasional freezing of rents has resulted in low land rents. These--combined with the lack of investment incentives and capital, the numerous labor laws such as those restricting the hiring of workers, and the migration of rural labor to cities--have encouraged "extensive" production practices and cattle grazing over crop production (34).

The uncertainties of rental and sharecropping arrangements are contributing to the decline of this system of production as landowners, eager to regain control of their land, have become unwilling to enter into new agreements. To some extent, the uncertainty has contributed to the development of a system of custom machine operators ("contratistas") who contract for only one crop. It is in the contratista's interest to obtain the greatest return from the land in the least possible time with no regard to conserving the productive capacity of the soil.

About 50 percent of all farms in 1960 were owner-operated, representing 53 percent of the area in farms. Tenants and sharecroppers run about 17 percent of farms, covering nearly 11 percent of the total area in farms. Another 7 percent of farms, with 8 percent of the farm area, were of mixed type, where the owner rents a part of his land (table 6).

Table 6.--Distribution of Argentina's farms and farm area by tenure system, 1960 ^{1/}

Tenure system	Farms		Area in farms	
	Thous.	Pct.	Mil. ha.	Pct.
Owner-operated.	230.6	49.5	92.0	53.0
Tenants and sharecroppers	76.7	16.5	18.6	10.6
Mixed	33.6	7.2	14.4	8.3
Squatters	15.8	3.4	4.1	2.4
Occupants of public lands	40.0	8.6	27.7	15.9
Other	68.8	14.8	17.1	9.8
Total.	465.5	100.0	174.0	100.0

^{1/} Based on a sample from the 1960 census of agriculture and adjusted for the total number of farms and the total area in farms.

Source: (34, p. 23).

Argentine Government efforts to extend private owner operation of land increased total owner-operated farmland from 36 percent in 1947 to 53 percent in 1960. ^{5/} A survey conducted by the Argentine Secretariat of Agriculture in 1965 estimated that owner-operated farms covered 75 percent of the area in farms in that year (65). Some of this increase in owner operation of land resulted from a conversion of renters and sharecroppers to owners, but a part was due to wider use of custom machine operators.

The Pampa region has the highest percentage of owner-operated farm area, ranging from 69 percent in La Pampa to 83 percent in Santa Fe. It has also the highest percentage of family-size farms (25 to 200 hectares)--53 percent, compared with 24 percent in the rest of the country.

Over 29 percent of the Pampa region is occupied by farms of 200 to 1,000 hectares, and nearly 52 percent is occupied by farms of over 1,000 hectares. The corresponding percentages for the rest of the country are 6 and 89 (table 5). However, some of the medium-size and large farms are underutilized as they represent investment in land as a hedge against inflation, a condition made possible by low land taxes.

Comparison of Large and Small Farms

Land Use

Most farm operations in the Pampa are of the mixed type, producing both grain and livestock. Very few produce solely one or the other. Two recent farm surveys indicate

^{5/} Another source (53) gives 59 percent for 1960. This percentage probably includes part-owners of operated land.

that pasture devoted to livestock increases as a percentage of total land area as the size of farms increases, while the area devoted to grains decreases 6/ (app. table 4). The data show an inverse relationship between farm size and stocking rates, which indicates more intensive utilization of farmland by small farm operators. Grain used for forage comprises a greater share of the total area under pasture on small farms. Small and medium-size farms appear to be more flexible in harvesting grain or using it as pasture depending on price and weather factors.

Income Structure

In the above-mentioned farm management studies, net income per farm increased as farm size increased. 7/ However, net farm income per hectare declined as farm size grew--a result of the more extensive farming methods used on the larger farms. Andruchowicz found that the higher net return per hectare from livestock on small farms more than offset a lower comparative return from crops, thus giving small farms a higher total net return per hectare than larger farms. The higher crop returns on large farms resulted from widespread use of a crop rotation that permitted better maintenance of soil fertility and hence higher crop yields. 8/ The higher livestock returns on small farms, on the other hand, came from the greater carrying capacity of their pastures, reflecting better and more intensive management practices than on large farms.

Capital Structure

In both studies, the amount of fixed capital (land, buildings, and improvements) increased with size of farm, both in absolute terms and as a share of total capital. This increase principally reflects the value of land as farm size increases.

Investment in machinery and equipment 9/ increased with farm size, but this type of investment's share of total capital investments decreased. A similar pattern held for working capital, 10/ with the one exception that in the Pergamino study, working capital as a percentage of total capital was highest on medium-size farms. Andruchowicz attributed this exception to the fact that these farms were substantial hog producers and hence had high investments in purchased feed and "other high costs associated with hogs" (3, p. 40). He theorized that the higher proportion of working to fixed capital on small farms could indicate overinvestment, partially the result of the ample income tax deduction incentives offered during the 1960's for the purchase of improved equipment.

6/ The first study was conducted in the county (partido) of 25 de Mayo in 1965 by Nocetti and Pereyra of the Pergamino experimental station (49). The other, by Andruchowicz, used survey data collected in 1968 within a 40-mile radius of Pergamino, including the counties of Pergamino, Calta, Rojos, and Bartolome Mitre (3).

7/ Cost of production included the following cash expenses: (1) Crops--fuel, oil, grease, pesticides, herbicides, seeds, and fertilizer plus the cost of labor actually used and interest on any capital used for crop production. (2) Livestock--veterinary services and medicines, purchases of livestock, and labor, machinery, and seeding expenses incurred in livestock production. (3) Other general expenses were those not included or allocated to crop or livestock production, such as taxes, repairs, and maintenance on buildings and equipment. No depreciation or investment in machinery was included.

8/ Large farms used a rotation of 3 to 5 years in pasture and 1 year in crops. On smaller farms with less area in pasture, the rotation was 1 to 3 years in crops and 1 year in pasture (3, pp. 26-29).

9/ So-called working fixed capital.

10/ Defined to include seeds, herbicides, and labor.

The percentage returns to total capital increase as size of farm increases, as is true of the rate of return on working-capital. ^{11/} This indicates that larger farms are more efficient in terms of returns on capital resources used, despite the extensive nature of the farms. The larger farms are more capital-intensive and the smaller farms are more labor-intensive, as shown by the capital/labor ratio. To this extent, the larger grain-livestock farms appear more profitable (in absolute terms) and make better use of their capital resources.

Current Land Use

In 1969/70, crops occupied about 8 percent of Argentina's 278 million hectares, grazing lands 53 percent, woods and forests 22 percent, and wastes and nonagricultural land the remaining 17 percent. ^{12/} Of the 147 million hectares of grazing lands, only about 6.5 percent were meadows and permanent grasslands, the rest being rough grazing lands largely unsuitable for other agricultural purposes (table 7). Over the last three decades, land use has shifted generally in favor of livestock production. Land under crops declined from 21 million hectares in 1941/42 to 17 million hectares in 1951/52, and then increased to 22 million hectares in 1969/70. Grazing lands expanded from 137 million hectares in 1941/42 to 147 million hectares in 1969/70. Although some of the grazing land expansion occurred at the expense of croplands, most of it was due to the contraction of forests and other nonagricultural land.

Table 7.--Land use in Argentina, 1941/42-1969/70

Year	: Cropland	: Grazing land <u>1/</u>	: Nonagricultural land	:	Total
	:	:	: Woods and	: Other	:
	:	:	forests	:	:
	:		<u>Million hectares</u>		
1941/42	: 20.9	136.6	70.2	50.1	277.8
1951/52	: 17.4	143.8	66.7	49.9	277.8
1961/62	: 19.0	145.6	63.9	49.3	277.8
1969/70	: 22.2	146.7	61.7	47.2	277.8
	:		<u>Percent</u>		
1941/42	: 7.5	49.2	25.3	18.0	100.0
1951/52	: 6.2	51.8	24.0	18.0	100.0
1961/62	: 6.8	52.4	23.0	17.8	100.0
1969/70	: 8.0	52.8	22.2	17.0	100.0

^{1/} Meadows and permanent grasslands and rough grazing land.

Source: (24).

The area in agricultural use (crop and grazing land) expanded from 157 million hectares in 1941/42 to 169 million hectares in 1969/70. The 1960 agricultural census lists potential additional cropland at 6 million hectares (63, p. 6), but most of this

^{11/} Return to capital in monetary terms = Net income less return to management for labor. Return to capital in percentage terms = $\frac{\text{Return to capital}}{\text{Total capital}}$

^{12/} 1969/70 refers to an Argentine production year with a spring and summer in 1969 and a fall and winter in 1970.

is probably in pastures which could be cropped only after expensive improvements.

The area devoted to major cultivated crops and forages increased gradually over the past two decades, fluctuating during the 1960's between 27.1 and 30.6 million hectares 13/ (app. table 6). In 1965/66-1969/70, grain area harvested for grain accounted for 41 percent of total cultivated crop area. Cultivated forages and grain area used for forage accounted for 43 percent. Oilseeds (flaxseed, sunflower, and peanuts) accounted for 9 percent, fruits and vegetables 4 percent, and industrial crops 3 percent. These percentages have remained relatively constant over the last two decades in terms of 5-year averages. The biggest shifts appear to have occurred within grains harvested for grain and within cultivated forages.

A decrease in cultivated forage area was almost offset by an increase in use of grains as forage. Of the grains used as forage, rye has been the most important (table 8). Forage use of rye, oats, and barley decreased slightly in importance during the 1960's, while such use of wheat, corn, and sorghum increased.

The Pampa region is clearly the most important agricultural area because it has the best soil and the most favorable climate. In 1961/62, it accounted for 90 percent of cropland, nearly all improved pastures, roughly 50 percent of all grazing land suitable for cattle, 38 percent of vineyards and orchards, and even 16 percent of woods and forests (app. table 5).

Commodity Production Trends

Wheat

During the 1960's, harvested wheat area increased but yields and production decreased (table 8); wheat area planted increased in the first half of the decade but in the second half stabilized around 6.5 million hectares (app. table 7). The low level of area planted in 1970/71 is at least partially due to drought conditions at planting time. If the unusually high production year of 1964/65 is left out of the trend, production shows a slight increase.

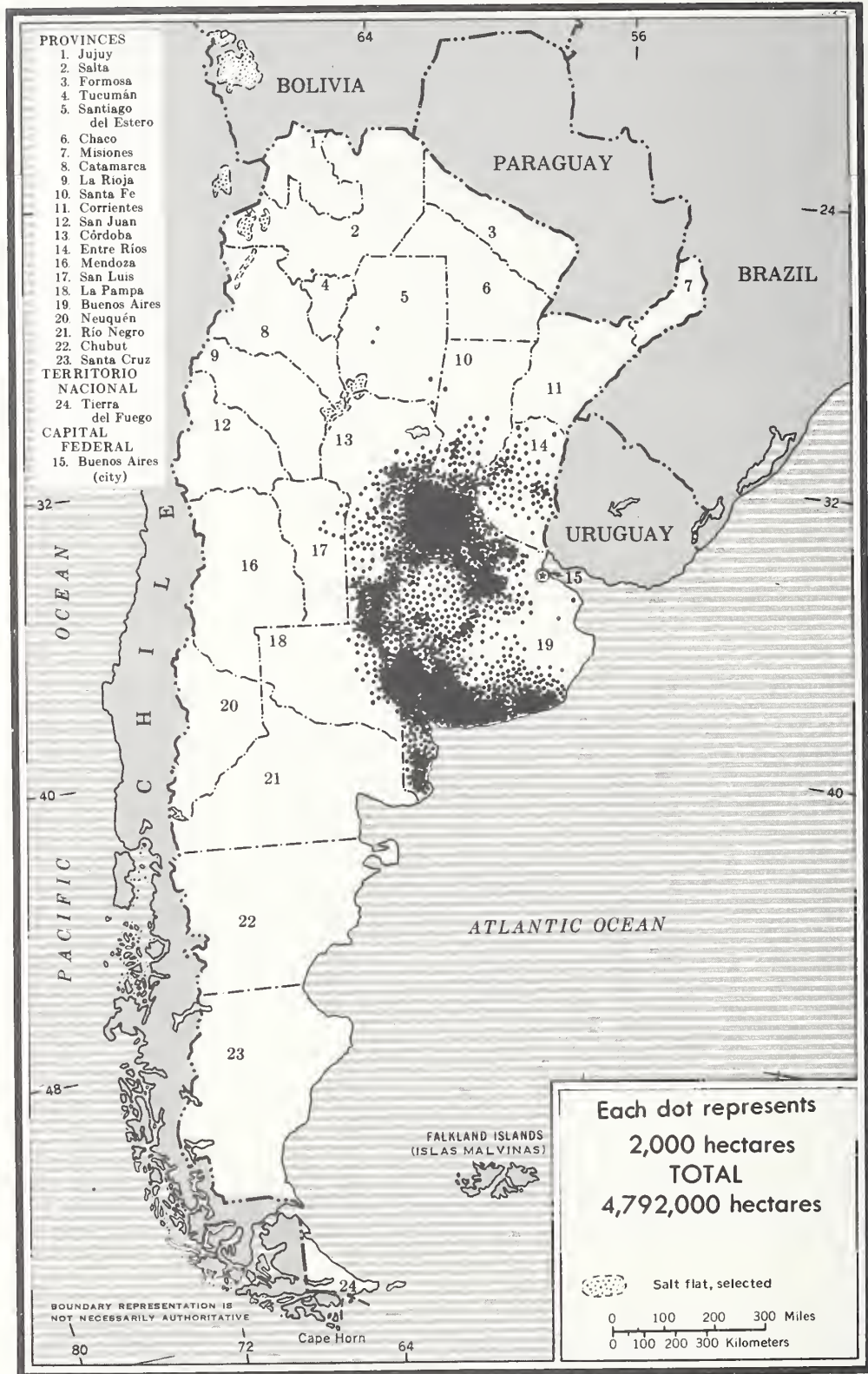
About 99 percent of Argentina's wheat is produced in the Pampa region (app. table 10). Buenos Aires Province (map 4) produces well over half the wheat--66 percent at the end of the 1960's, up from 57 percent at the beginning of the decade. Small decreases occurred in Sante Fe and Cordoba Provinces, while Entre Rios and La Pampa Provinces maintained a constant percentage of total production. Throughout the Pampa, wheat competes with other grains, flax, and beef cattle for the available land and other resources. In southeastern Buenos Aires, potatoes are an additional competitive crop (72, 33, and 13).

Northwestern Buenos Aires and southern Sante Fe, together accounting for about 20 percent of total wheat production, probably have optimum conditions for wheat growing because they have few droughts and late frosts.

In central Sante Fe and northeastern Cordoba, droughts and high winter temperatures cause wide yield fluctuations. In Entre Rios, yields can be equally irregular because of high winter temperatures and excessive rains.

13/ The numbers differ from data in tables 11 and 12, which are census data and exclude multiple cropping but appear to include forages under meadows and permanent grassland.

ARGENTINA: WHEAT AREA, 1960



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Map 4

Table 8.--General trends in Argentine grain and livestock production,
1960/61-1969/70

Commodity	1960/61- 1964/65	1965/66- 1969/70	Percent change
Area planted (1,000 hectares):			
Wheat.	5,369	6,309	17.5
Corn	3,483	4,362	25.2
Sorghum.	1,110	1,872	68.6
Barley	1,103	933	-15.5
Oats	1,331	1,176	-11.6
Rye.	2,414	2,339	-2.1
Total.	14,810	16,991	14.7
Flaxseed	1,304	952	-27.0
Sunflowerseed.	1,100	1,302	18.4
Area harvested (1,000 hectares):			
Wheat.	4,720	5,331	12.9
Corn	2,836	3,535	24.6
Sorghum.	617	1,171	89.8
Barley	614	458	-25.4
Oats	608	424	-30.3
Rye.	629	490	-22.1
Total.	10,024	11,409	13.8
Yields/ha. harvested (kilograms): 1/			
Wheat.	1,480	1,220	-17.6
Corn	1,760	2,140	21.6
Sorghum.	1,860	2,000	7.5
Barley	1,210	1,120	-7.4
Oats	1,230	1,240	0.8
Rye.	730	655	-10.3
Total.	1,380	1,400	1.4
Production (1,000 metric tons):			
Wheat.	7,165	6,481	-9.6
Corn	4,984	7,564	51.8
Sorghum.	1,144	2,342	104.7
Barley	753	511	-32.1
Oats	748	525	-29.8
Rye.	474	321	-32.3
Total.	15,268	17,744	16.2
Flaxseed	761	536	-29.6
Sunflowerseed.	625	972	55.5
Production (1,000 metric tons): 2/			
Beef (carcass weight).	2,208	2,450	11.0
Pork (carcass weight).	169	208	23.0
Mutton (carcass weight).	157	191	21.7
Area planted but not harvested (1,000 hectares):			
Wheat.	649	978	50.7
Corn	647	827	27.8
Sorghum.	493	701	42.2
Barley	489	475	-2.9
Oats	723	752	4.0
Rye.	1,785	1,849	3.6
Total.	4,786	5,582	16.6
Forage area (1,000 hectares)	7,912	7,107	-10.2
Forage area plus grain area planted but not harvested	12,698	12,689	-.1

1/ Rounded to nearest 10 kilograms.

2/ Averages for 1960-64 and 1965-69.

Sources: Computed from data in app. tables 7, 8, and 9.

In southern Buenos Aires, yields are relatively good. Wheat grown there often serves as a dual-purpose grain, being both grazed and harvested.

In eastern La Pampa and southern Cordoba, low winter temperatures favor wheat production but occasional late frosts and droughts make yields irregular. Wheat grown is also predominantly dual-purpose.

Corn

Corn is grown over a wider area of the country than wheat. During the 1960's, there were about equal percentage increases in area planted and harvested and in yields, with a substantial increase in production (table 8). Corn is grown in almost all Provinces north of the Colorado River (map 5), but about 90 percent is produced in the Pampa region (app. table 10). The Provinces of Buenos Aires (36 percent), Santa Fe (30 percent), and Cordoba (19 percent) account for most. Irregular rainfall in Entre Rios, along with high temperatures during the germination period, keeps yields and production there relatively low (33). Since 1960, there has been very little change in the percentage of corn produced by each Province.

Sorghum Grain

Sorghum production during the 1960's ranged from 0.9 million tons in 1964/65 to 3.8 million in 1969/70 (app. table 7). Area planted increased from 0.9 to 2.6 million hectares. During the 1960's, 47 to 74 percent of the area planted was harvested for grain, with the more usual figure ranging around 60 percent. Average sorghum yields are higher than other grain yields and were so throughout the decade, ranging from 1.5 up to 2.6 tons per harvested hectare. Yields tend to fluctuate fairly widely from year to year and show no trend.

Almost 90 percent of all sorghum grain is produced in the Pampa region. The most important producers are Cordoba (30 percent), Santa Fe (28 percent), and Buenos Aires (18 percent) Provinces (app. table 10). The Pampa region is declining in importance; its share of production decreased from 95 to 88 percent during the 1960's. The largest decrease--from 44 to 28 percent--occurred in Santa Fe Province. Increases occurred in the drier fringe areas of Chaco, Entre Rios, Cordoba, and La Pampa.

Barley

Barley area planted and production generally decreased during the 1960's (app. table 8). Yields generally declined over the 1950's, then stabilized at slightly over 1,000 kilograms per harvested hectare through the 1960's. Between 32 and 65 percent of total area planted is harvested for grain. This percentage appears to be decreasing, at least when compared with data for the 1950's.

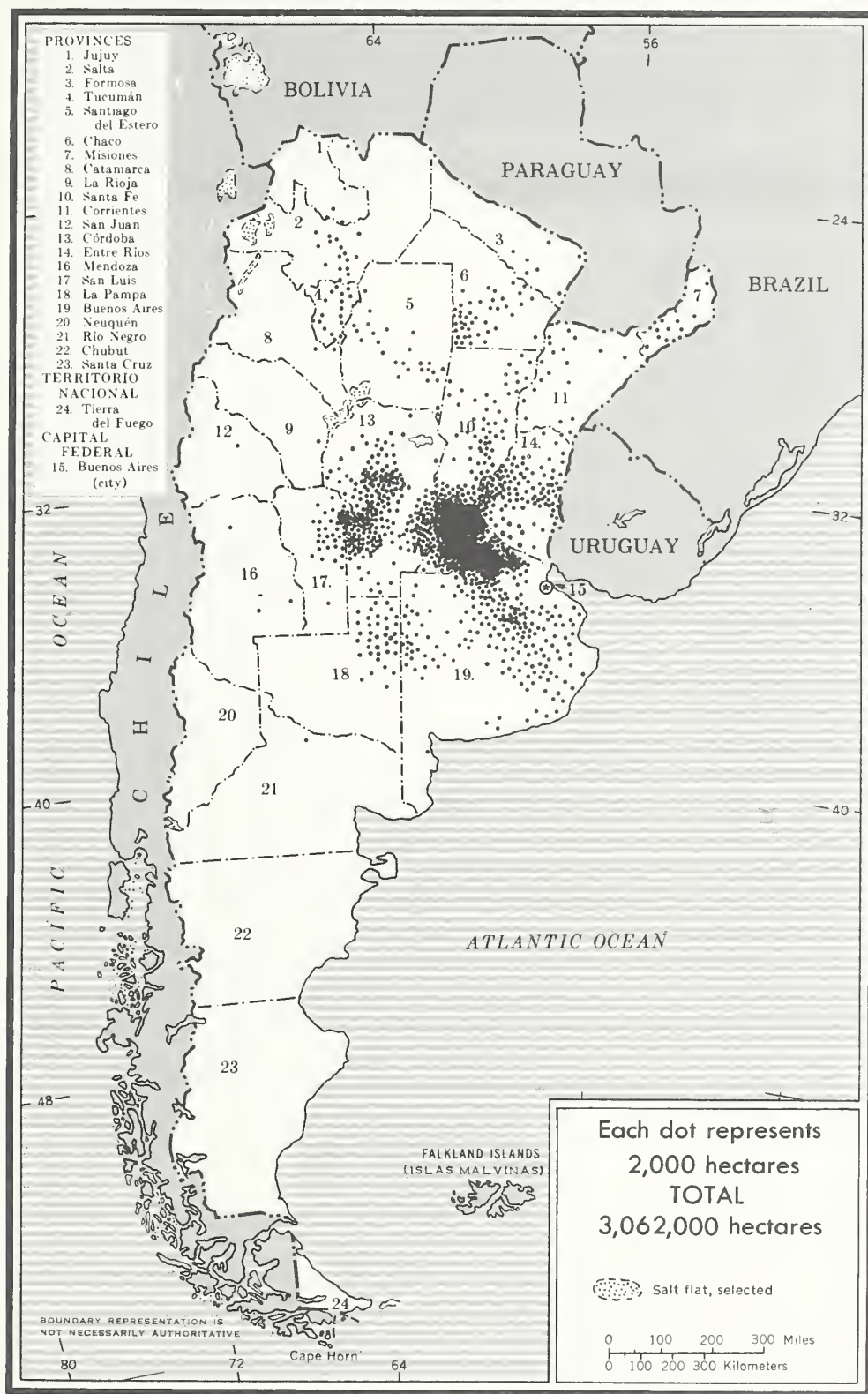
About 98 percent of Argentina's barley is produced in the Pampa region. The Provinces of Buenos Aires (76 percent) and Cordoba (10 percent) account for most.

Oats

Oats area and production generally declined during the 1960's (app. table 8). Between 29 and 50 percent of the area planted was harvested for grain, with the more usual figure being around 40 percent. Yields fluctuated between 1,100 and 1,400 kilograms, with no trend.

Essentially all oats are produced in the Pampa region, with Buenos Aires Province accounting for 93 percent. There was no major shift among Provinces in production during the 1960's.

ARGENTINA: CORN AREA, 1960



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Map 5

ARGENTINA: FLAX AREA, 1960



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Map 6

Rye

Rye performance has been much the same as that of barley and oats--production and area declining while yields fluctuate but without a discernible trend (app. table 8). Only 12 to 36 percent of rye area planted is harvested for grain. The rest is used for temporary pasture or green manure. The percentage of area not harvested has been trending upward.

Over 97 percent of rye grain is produced in the Pampa region (app. table 10). Buenos Aires Province, with 60 percent, and La Pampa Province, with 25 percent, account for most production. During the 1960's, there was a slight shift in production to Buenos Aires and a corresponding decline in Cordoba.

Oilseeds

Argentina's two most important oilseeds, by value of production and relevance to the grain-livestock sector, are flax and sunflower. Flaxseed production decreased 30 percent during the 1960's, while sunflower seed production increased 56 percent (table 8).

Flax production is centered in three main areas: southern Buenos Aires, Entre Rios, and Santa Fe-central Cordoba. Each zone accounts for about one-third of total flax production (map 6). Flax competes for available land mainly with wheat and cattle.

Sunflower is grown primarily in the Pampa region. Small quantities are produced in the Chaco region. In the Pampa, about 80 percent of sunflower is planted on wheat areas after the wheat harvest (33).

Beef

Beef slaughter data may be fairly good, but the precise number of cattle in Argentina is the subject of much debate. The 1969 census reported 48.3 million head, but many people believe this is too high by several million.

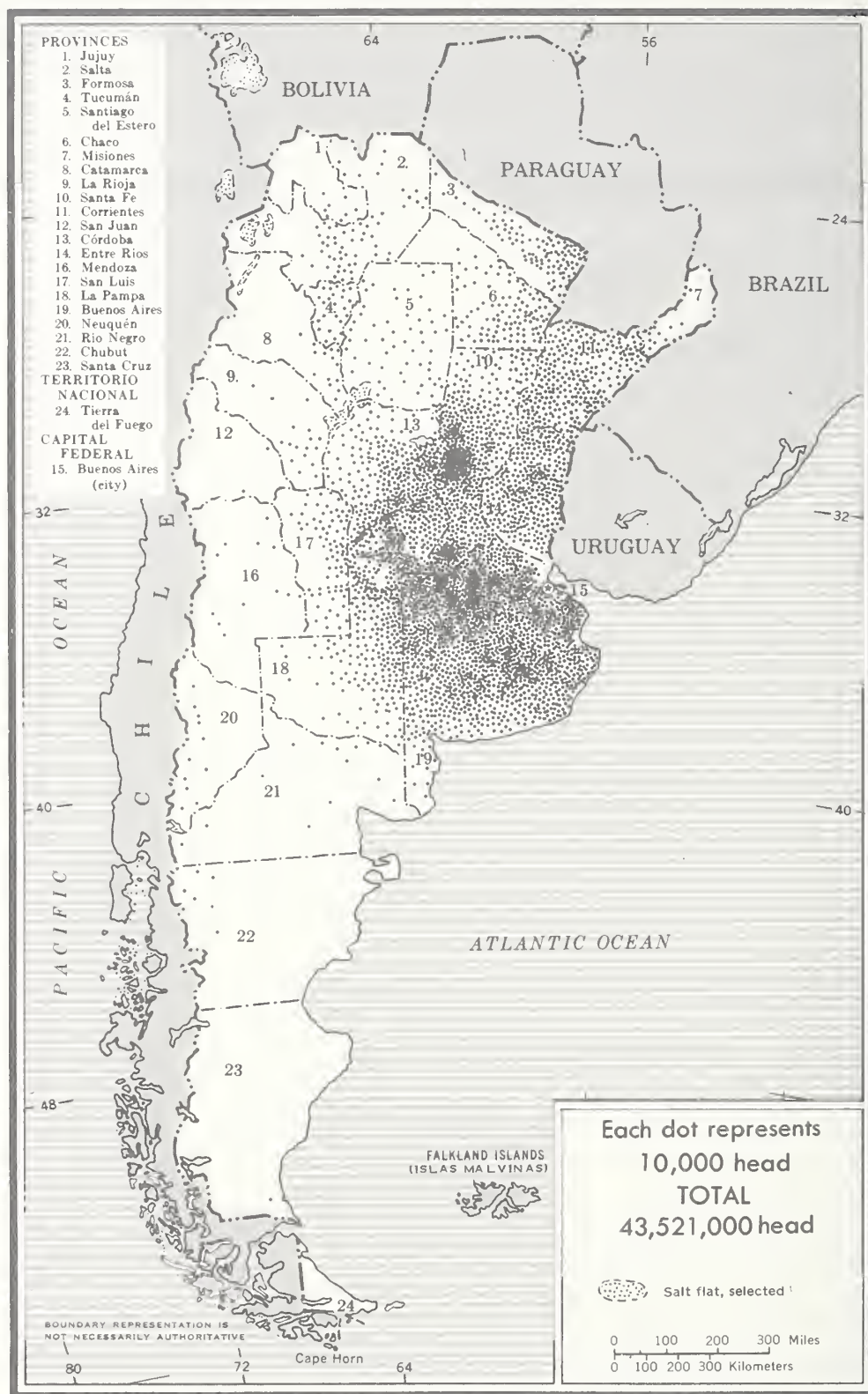
Slaughter numbers ranged from 8.8 to 13.8 million cattle during 1960 through 1970 (app. table 9). These cattle provided 1.9 to 2.9 million tons of beef (carcass weight basis). Average carcass weight per animal slaughtered ranged from 200 to 218 kilograms.

Argentina exports 18 to 29 percent of beef production. Carcass weight per animal slaughtered averaged 48 kilograms higher for the export trade in 1965-69 than for animals consumed domestically (244 vs. 196 kgs.). From 1960-64 through 1965-69, average slaughter weight for export cattle increased from 231 to 244 kilograms carcass weight basis, while that for cattle for domestic consumption decreased by 5 kilograms. Annual beef production during 1965-69 averaged 11 percent higher than in the previous 5-year period (table 8). Production going for export increased almost 20 percent and production for domestic consumption increased 8 percent over the same period.

Cattle are produced over much of the country, with the heaviest concentration in the Northeast (map 7). Pampean Provinces accounted for about 80 percent of all cattle in 1969 according to the 1969 agricultural census (app. table 10). About 39 percent of the cattle were in Buenos Aires Province. There was no shift in the proportion of cattle in each of the country's major regions between the census years 1960 and 1969.

Ecological conditions generally determine the kind of cattle operation. Where grass quality is poor, beef cattle breeding is practiced. Such is the case in almost all of Entre Rios Province, the basin of Rio Salado in the northern part of Buenos Aires

ARGENTINA: CATTLE, 1960



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Map 7

Province, all of Corrientes Province, and eastern Buenos Aires Province. On the other hand, winter fattening of cattle is practiced where the grass is good--in southern Buenos Aires, eastern La Pampa, northwest Buenos Aires, southern Santa Fe, and central Entre Rios (33).

Sheep

The 1969 agricultural census reported about 44.3 million sheep in Argentina. Production of mutton and lamb ranged from 135,000 tons to 209,000 tons during 1960-69 (app. table 9). Of this, 20,000 to 74,000 tons were exported. Using two 5-year averages (1960-64 and 1965-69), mutton and lamb production increased about 22 percent over the decade. The Pampa region accounted for 48 percent of sheep numbers in 1969; most of the rest were in Patagonia (map 8 and app. table 10). Buenos Aires Province is the largest producer of sheep, accounting for almost 37 percent of the total in 1969.

Pork

The 1969 agricultural census reported 4.1 million hogs (app. table 10). Slaughter numbers for 1960-69 ranged from 1.0 to 2.9 million hogs. These provided 154,000 to 233,000 tons of pork. Exports during the same period ranged from 5,000 to 17,000 tons. From 1960-64 through 1965-69, pork production increased 23 percent (table 8). In 1969, about 90 percent of the hogs were in the Pampa region. Cordoba Province has the most, followed closely by Buenos Aires and Santa Fe.

IV. FACTORS RESPONSIBLE FOR SHIFTS IN PRODUCTION, 1960-70

This chapter deals with the impact of economic, technological, and institutional factors on Argentine grain and livestock production. Although each is distinct, they interact to affect producer decisions.

Economic Factors

The direct impact of prices on grain and livestock producer decisions in Argentina is difficult to isolate because: (1) Whether farmers graze part of their sown grains or allow them to mature and harvest them as grain depends on factors other than price, notably weather; (2) there is a distinct livestock cycle; and (3) Government policies often distort or counteract the impact of price movements at the farm level.

Supply Response to Price

Data on farm gate prices are not available for Argentina. Therefore, we used Buenos Aires market prices as proxies for producer prices and for the calculation of gross returns per hectare, to evaluate the effect of price changes on production patterns. ^{14/}

Because wheat has the same cropping pattern as other small grains and flax--all are planted between May and September--it should compete more directly for area with

^{14/} Official support prices--except for wheat--have trended far below domestic market prices and thus provide little insight into producer decisions. See ch. VI for more details.

ARGENTINA: SHEEP, 1960



U.S. DEPARTMENT OF AGRICULTURE

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Map 8

these than with corn, sorghum, or sunflower. The price and area planted of other small grains and flax decreased relative to the price and area of wheat during the 1960's (table 9). The price and area of sorghum increased relative to the price of wheat.

During the 1950's, the wheat/beef price ratio and the area planted to wheat decreased. However, during the mid-1960's, the wheat/beef price ratio decreased, while area planted to wheat increased (fig. 1).

The price ratio of cash crops to beef decreased during the 1960's. This decreasing ratio is consistent with increasing cattle numbers and slaughter over the 1960's, but not with the changes in area planted to cash crops or forages.

Changes in Gross Returns

Gross returns per hectare were calculated for 1960 through 1969 for each crop to determine whether these may provide a better indication of farmers' response than prices--since they represent the total earning power of a crop per unit of land. 15/

Gross returns per hectare were generally greater for corn and sorghum than for wheat (table 10). Returns were greater for wheat than for corn in only 1 year and for sorghum in 4 years because of poor corn and sorghum yields in those years. Returns for the other small grains were consistently below those for wheat. Returns for oilseeds showed no clear pattern.

In the Pampa Provinces, the percentage changes in area planted to corn and sorghum are consistent with the changes in their returns except in La Pampa Province (table 10 and app. table 11). In La Pampa, despite decreasing returns for corn and sorghum, the percentage of area planted doubled during the 1960's. It remains small, however, in relation to total area planted to major grains and oilseeds. Returns for corn and sorghum in Cordoba Province decreased in absolute terms over the last decade, but in relation to wheat greatly increased. The percentage of area in corn and sorghum expanded sharply while that of wheat contracted. In Buenos Aires Province, returns for sorghum during the 1960's remained below those of wheat--partly explaining why the area planted to sorghum remained a constant percentage of the total area planted to major grains and oilseeds.

Except in Santa Fe and Cordoba Provinces, however, the percentage changes in area planted to wheat were not consistent with the changes in wheat returns. Excluding oats in Santa Fe and Entre Rios, the percentage of area planted to small grains decreased over the 1960's, a change consistent with the decrease in their returns.

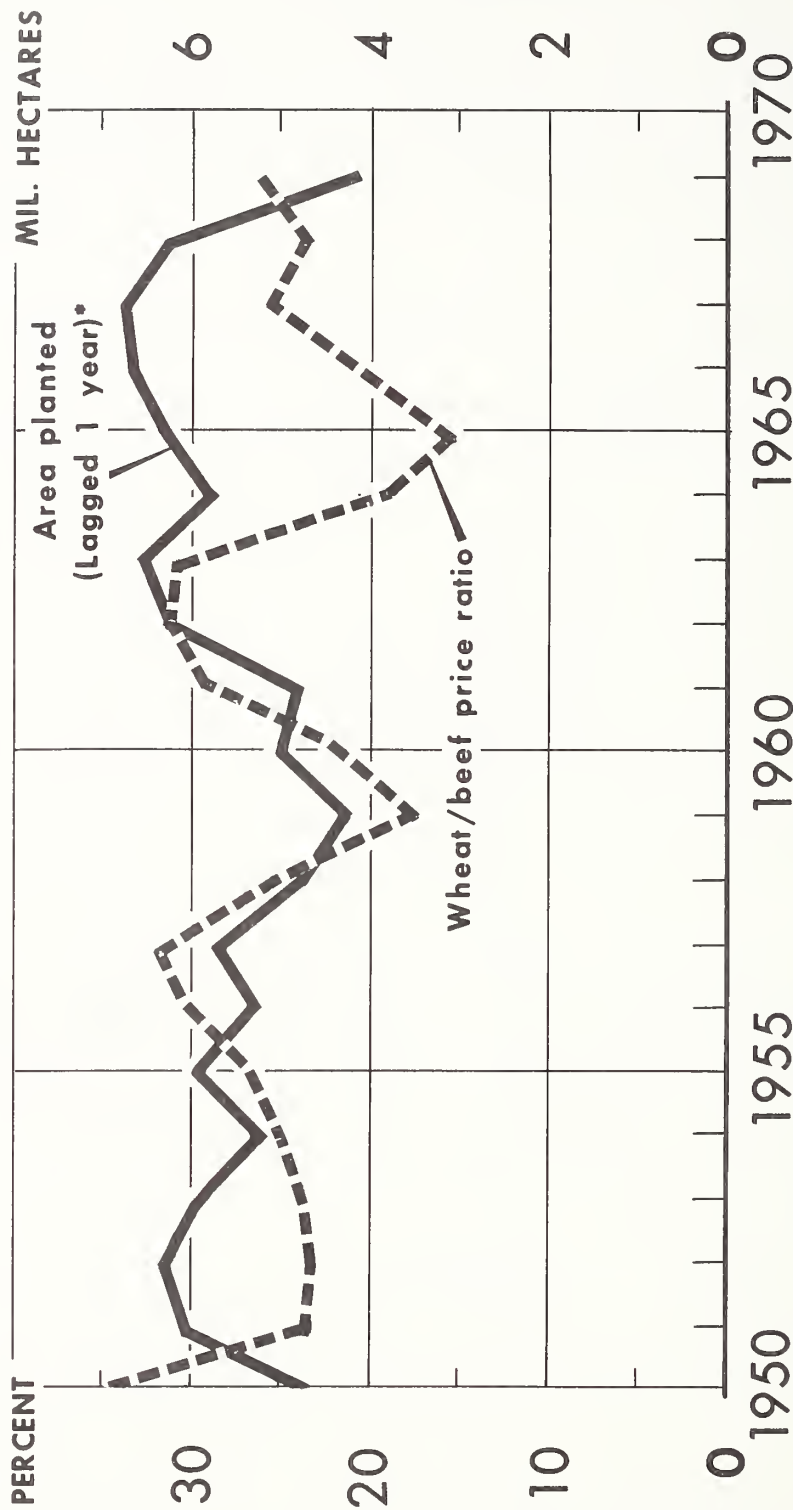
In "other Provinces," the percentage of area planted to corn decreased, a change consistent with the decrease in returns per hectare for corn. The percentage of area planted to sorghum and wheat increased, as did their returns. The area planted to sunflower increased, while its returns decreased.

Changes in Production Costs

Input price changes.--In general, input prices did not increase during the 1960's except for labor and seeds. Wages increased in response to a shortage of agricultural workers. Seed prices rose during the first half of the 1960's, because of increased use of more costly improved or hybrid varieties. Except for flax seed, prices of seeds declined or remained unchanged thereafter (table 11).

15/ Gross returns per hectare = market prices in Buenos Aires times the average yield per hectare harvested.

ARGENTINA: WHEAT/BEEF PRICE RATIO AND WHEAT AREA



*1965 WHEAT/BEEF PRICE RATIO IS PLOTTED WITH THE 1966 AREA PLANTED TO WHEAT ON CALENDAR YEAR 1965.

Figure 1

Table 9.--Indexes of market price of selected agricultural commodities relative to wheat and beef, 1950-69 1/

Year	Index of market price relative to wheat										: Index of market price re-		
	Wheat : (hard & : : semihard):	Corn :	Rye :	Barley : (malt) :	Oats : (yellow):	Sorghum :	Flax :	Sun- flower :	Cattle :	Wheat : (hard & : : semihard):	Wheat : (hard & : : semihard):	Corn :	Total
1950-54 <u>3/</u>	100	111	81	84	79	n.a.	148	122	391	26	26	28	31
1955-59 <u>3/</u>	100	104	83	85	100	82	220	210	402	25	25	26	34
1960-64 <u>3/</u>	100	89	86	86	88	71	182	185	389	26	26	23	30
1965-69 <u>3/</u>	100	85	76	83	83	77	173	162	453	22	22	19	23
1960. . . .	100	88	74	84	91	71	190	185	460	22	22	19	24
1961. . . .	100	92	76	75	71	64	204	203	350	29	29	27	32
1962. . . .	100	97	97	108	102	84	189	149	313	32	32	31	35
1963. . . .	100	93	105	89	99	68	165	178	323	31	31	29	34
1964. . . .	100	73	76	72	74	62	160	210	518	19	19	14	20
1965. . . .	100	110	85	101	98	99	177	203	670	15	15	17	17
1966. . . .	100	78	80	101	100	73	167	173	468	21	21	17	23
1967. . . .	100	79	72	77	71	73	147	126	392	26	26	21	25
1968. . . .	100	81	67	72	77	72	185	151	414	24	24	19	24
1969. . . .	100	84	68	71	76	76	190	166	384	26	26	22	28

1/ Prices for grains and oilseed, basis Buenos Aires on wagon. Prices for livestock, basis Liniers Market (B.A.), average of all liveweight cattle prices. 2/ Average of prices of wheat, corn, flax, and sunflower weighted by their production. 3/ Based on averages of prices of selected commodities in relation to average prices of wheat and beef rather than simple average of indexes.

Sources: Grains and oilseeds (9, 1959-70); livestock (37, 1969).

Table 10.--Gross returns per hectare for selected agricultural commodities by Province, Argentina, 1960-69 ^{1/}

Province and commodity	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	Average 1960-64	Average 1965-69
1,000 1965 pesos per hectare												
<u>Buenos Aires</u>												
Wheat	11.6	12.2	14.5	17.4	17.7	14.6	12.8	14.3	13.0	10.3	14.7	13.0
Corn	14.5	18.8	19.6	20.7	16.3	16.6	18.0	27.5	16.3	23.5	18.0	20.4
Sorghum	12.7	13.3	12.9	11.1	10.9	10.7	11.8	12.2	9.0	15.3	12.2	11.8
Barley	9.4	8.6	13.2	8.2	11.1	12.0	10.0	9.5	8.9	7.5	10.1	9.6
Oats	10.9	8.2	13.0	14.0	9.7	10.9	10.3	10.3	7.4	6.4	11.2	9.1
Rye	5.8	6.5	8.2	7.7	7.1	6.2	5.5	6.0	4.0	3.9	7.1	5.1
Sunflower	12.3	13.4	11.1	12.7	12.9	11.5	13.0	12.2	12.4	12.0	12.6	12.3
Flaxseed	14.0	13.9	14.9	16.0	11.9	11.5	10.9	16.1	13.2	11.0	14.2	12.7
<u>Santa Fe</u>												
Wheat	14.1	11.5	15.1	20.5	12.5	15.4	11.9	11.1	10.9	9.2	14.8	11.7
Corn	18.2	19.2	22.9	19.6	16.8	16.2	19.0	26.4	20.3	17.4	19.3	19.9
Sorghum	12.3	20.4	19.8	14.3	11.6	10.7	20.6	15.3	13.6	15.6	15.7	15.2
Barley	9.7	8.8	12.7	16.6	8.3	11.7	9.5	7.2	7.5	8.1	11.2	8.8
Oats	--	7.2	8.8	9.7	6.2	9.9	7.3	3.8	3.6	3.7	6.4	5.7
Rye	--	4.2	6.8	8.0	4.3	5.0	4.1	4.1	4.0	4.3	4.6	4.3
Sunflower	16.5	13.9	12.1	12.3	14.3	11.1	11.0	13.0	16.3	13.6	14.0	13.1
Flaxseed	14.7	13.2	13.5	11.9	9.8	10.2	6.1	9.8	9.7	11.8	12.6	9.6
<u>Cordoba</u>												
Wheat	15.7	10.1	11.7	17.4	9.8	13.6	8.8	10.1	9.6	7.7	12.9	10.0
Corn	14.2	17.2	23.2	18.2	10.3	14.7	13.7	18.7	15.2	10.3	16.6	14.5
Sorghum	11.9	10.6	24.9	13.4	9.4	11.7	15.6	13.8	12.3	13.5	14.1	13.4
Barley	12.1	8.1	11.6	13.1	6.2	12.4	6.6	5.7	6.4	5.9	10.2	7.4
Oats	9.4	5.2	8.0	6.3	4.0	5.2	4.4	7.5	3.6	3.2	6.6	4.8
Rye	6.6	5.0	7.1	7.5	3.6	4.9	3.3	4.0	3.5	3.0	6.0	3.7
Sunflower	12.1	13.0	10.5	10.7	9.5	10.0	9.5	11.0	10.7	11.1	11.3	10.5
Flaxseed	13.4	11.4	12.5	8.6	7.4	12.4	6.3	6.9	10.9	10.6	10.6	9.5
<u>Entre Rios</u>												
Wheat	8.7	6.7	12.8	15.6	11.5	10.4	9.2	11.1	7.1	9.4	11.1	9.4
Corn	7.5	11.7	10.8	9.3	7.6	8.6	9.4	10.5	6.6	12.8	9.4	9.6
Sorghum	7.3	6.5	8.0	8.7	7.6	7.5	12.3	13.3	8.5	13.8	7.6	11.0
Barley	4.1	3.3	7.0	6.5	3.8	5.1	4.0	3.5	n.a.	n.a.	4.9	2/4.2
Oats	4.3	4.8	6.8	8.5	4.4	5.7	5.0	4.9	2.2	4.0	5.8	4.4
Rye	4.4	3.9	6.1	8.2	4.9	5.2	n.a.	4.6	n.a.	n.a.	5.5	3/4.9
Sunflower	11.7	13.6	10.2	13.1	13.7	8.8	7.1	7.1	6.5	9.6	12.5	7.8
Flaxseed	11.4	10.6	13.9	11.5	9.3	7.7	7.3	8.3	7.2	12.9	11.3	8.6
<u>La Pampa</u>												
Wheat	10.7	7.3	9.7	6.4	15.8	9.7	5.4	9.5	9.6	8.2	10.0	8.5
Corn	10.2	6.8	6.9	10.7	5.1	6.4	4.7	6.0	6.3	6.5	7.9	6.0
Sorghum	8.4	4.6	5.2	8.5	3.6	3.9	3.3	4.1	4.7	7.9	6.1	4.8
Barley	9.1	4.8	9.4	5.3	11.5	9.9	6.1	7.0	7.7	6.9	8.0	7.5
Oats	8.4	3.8	8.5	4.9	9.4	6.7	2.9	5.9	4.3	3.9	7.0	4.7
Rye	4.7	3.4	6.9	3.7	5.7	4.4	2.4	3.5	3.5	3.0	4.9	3.3
Sunflower	9.4	8.2	5.4	9.5	7.1	6.9	6.0	5.6	6.7	10.7	7.9	7.2
Flaxseed	8.5	6.9	8.3	6.4	6.1	5.2	5.6	6.6	8.2	8.6	7.2	6.8
<u>Rest of country</u>												
Wheat	9.1	10.1	8.9	11.5	10.5	10.5	6.9	13.8	11.2	10.6	10.0	10.6
Corn	8.6	10.2	11.9	12.6	7.4	9.2	7.3	12.1	8.0	7.6	10.2	8.9
Sorghum	14.0	12.6	15.4	13.4	10.2	14.8	13.0	16.1	14.0	14.1	13.1	14.4
Barley	9.5	7.6	11.2	9.6	6.4	7.4	9.0	8.1	5.5	6.5	8.9	7.3
Oats	7.7	7.2	7.1	7.6	4.8	4.9	5.9	5.0	2.7	1.2	6.9	3.9
Rye	4.9	4.5	5.3	7.5	4.2	5.7	4.1	3.8	3.4	3.8	5.3	4.1
Sunflower	12.1	13.7	13.1	14.4	13.0	15.7	9.0	13.6	11.2	8.8	13.4	11.8
Flaxseed	8.2	8.9	7.9	15.2	6.3	5.4	10.4	10.4	6.9	14.7	9.2	9.6
<u>Total country</u>												
Wheat	12.6	11.2	13.5	17.4	15.4	13.8	11.5	12.7	11.7	9.5	14.0	11.9
Corn	14.2	16.5	19.2	17.6	12.8	13.9	14.7	20.7	14.7	15.6	16.1	15.9
Sorghum	12.1	14.8	18.7	12.9	10.6	10.9	16.0	13.9	11.7	14.1	13.8	13.3
Barley	9.9	8.3	12.3	9.5	10.6	11.8	9.3	8.7	8.2	7.2	10.1	9.0
Oats	10.6	7.9	12.4	13.4	9.4	10.4	10.0	9.8	7.2	6.0	10.8	8.7
Rye	5.6	5.3	7.4	6.9	6.1	5.4	4.7	4.8	3.7	3.5	6.3	4.4
Sunflower	12.8	13.4	11.2	12.5	12.9	11.5	11.6	12.0	12.6	11.8	12.6	12.0
Flaxseed	13.3	12.2	13.7	12.1	9.9	10.1	8.3	11.3	10.8	11.6	12.3	10.4

^{1/} Based on market prices in Buenos Aires and corresponding crop year yields by Province. For example, 1960 grain prices in Buenos Aires are multiplied by 1959/60 crop year yield. ^{2/} 3-year average, 1965-67. ^{3/} 2-year average of 1965 and 1967.

Source: Based on data in (9, 1960-70).

Table 11.--Indexes of factor-input prices, Argentina, 1959-69

Input	: Base per- iod, 1,000: : 1965 pesos:	: 1959 :	: 1960 :	: 1961 :	: 1962 :	: 1963 :	: 1964 :	: 1965 :	: 1966 :	: 1967 :	: 1968 :	: 1969 :
Labor:												
Worker (per month)	9.6	80	72	70	75	62	79	100	107	118	113	116
Supervisor (per month) . .	12.1	68	61	64	78	64	79	100	111	124	121	122
Tractors:												
70-80 h.p.	1,419.6	111	118	107	97	106	98	100	106	114	112	107
50-60 h.p.	1,066.0	118	128	117	107	114	102	100	104	130	126	116
Plows:												
5 bottom - 14"	202.5	84	84	77	88	89	98	100	117	127	110	107
5 discs - 26"	293.0	94	88	79	78	78	85	100	103	104	90	85
Disc harrow - 32 discs. . .	111.1	109	113	102	91	90	96	100	158	168	153	150
Seed drill - 28 discs . . .	323.3	60	94	90	86	85	92	100	96	108	95	96
Harvester - 16' diesel. . .	2,278.5	105	103	97	90	97	95	100	100	100	99	96
Wire (1,070 m.) . . . . .	.4	96	74	80	74	73	72	100	93	103	98	94
Posts (100 units)	69.2	129	133	142	86	74	75	100	95	86	83	100
Fuel (1,000 liters)	9.6	181	150	133	122	123	100	100	111	110	100	93
Grease (1,000 kgs.)	69.7	118	103	94	112	139	113	100	116	129	124	111
Mafta (1,000 liters)	12.1	171	143	117	113	144	113	100	111	110	162	171
Bags (1,000 units)	51.0	115	133	119	120	131	110	100	107	110	106	98
Seeds (100 kgs.):												
Wheat	1.8	n.a.	47	n.a.	n.a.	110	n.a.	100	n.a.	96	n.a.	101
Corn.	5.3	n.a.	54	n.a.	n.a.	102	n.a.	100	n.a.	94	n.a.	96
Sorghum	8.4	n.a.	n.a.	n.a.	n.a.	117	n.a.	100	n.a.	n.a.	n.a.	70
Flax.	2.2	n.a.	98	n.a.	n.a.	103	n.a.	100	n.a.	101	n.a.	128
Sunflower	3.3	n.a.	n.a.	n.a.	n.a.	136	n.a.	100	n.a.	76	n.a.	79

Sources: For seeds - (50, 32, 47, and 98); for other - (68).

Prices of tractors and other agricultural equipment, high in relation to tractor and equipment prices in other countries, decreased in real terms through the mid-1960's but have been unevenly higher since then.

Workers have been leaving agriculture, partly because nonagricultural wages are higher (24, p. 193) and partly because of the land tenure system. With the abolition of rent freezing in 1952, tenants, faced with a choice of purchasing farmland or migrating to the cities, migrated.

Through the early 1950's, seasonal labor shortages were the rule rather than the exception. The increase in mechanization and the development of the "contratista" system in the middle 1950's, however, reduced the demand for seasonal labor by the late 1960's (24, p. 188). Use of tractors, mechanical harvesting, and bulk handling has increased labor productivity in harvesting even though there has been no appreciable change in labor requirements per hectare of crop cultivated (table 12). The labor required to harvest 1 hectare of corn decreased by more than half during the 1960's, while that for other grains remained fairly constant. The introduction of combines, which harvest and shell corn in one operation, has reduced seasonal labor requirements for corn production.

Table 12.--Labor requirements for cultivating and harvesting selected agricultural commodities, Argentina, 1960-69

Year	Corn	Wheat	Sorghum	Flax	Sunflower
Cultivation (Hrs./hectare) 1/					
1960 2/	5.21	3.49	n.a.	3.89	n.a.
1963 3/	5.25	3.45	3.45	3.45	4.50
1969 4/	5.25	3.60	3.76	3.60	4.42
Harvesting (Hrs./hectare) 5/					
1960 2/	2.63	n.a.	n.a.	n.a.	n.a.
1963 6/	n.a. (5.0)	n.a. (2.3)	n.a. (2.3)	n.a. (2.0)	n.a. (2.3)
1965 7/	1.0 (3.0)	.66 (2.2)	.66 (2.2)	.66 (2.2)	1.0 (2.3)
1969 4/	1.0	.66	.66	.66	.66

1/ Includes plowing, discing, harrowing, sowing, and spraying for all crops. For corn, hilling and weeding are added. For sunflower, weeding is added. 2/ (56, pp. 14-33). 3/ (48, p. 20). 4/ (44, p. 5). 5/ Figures in parentheses are total hours needed for the total harvest operation, including handling of bags. Figures outside parentheses are for labor hours required to harvest the crop only. 6/ (47, pp. 11-23 and 20, p. 10). 7/ (49, pp. 51-58).

Argentina imports over 90 percent of its fertilizer. To assist domestic industry, the country had high import duties on fertilizer through 1963--which greatly added to the cost of fertilizer to Argentine farmers. There are still significant duties on nitrogen. During most of the 1960's, the response of fertilizer experiments to Argentine varieties of corn and wheat was inconclusive. Because of this and the high cost of fertilizers, it was not thought economical to fertilize. 16/

16/ See next section on technological factors for greater detail.

Influence of input prices relative to product prices.--The input/wheat price index plotted with the wheat area planted for 1959 through 1969 (fig. 2) shows that during periods when wheat prices were high relative to input prices, wheat area planted increased and vice versa. 17/

Similarly, the input/beef price ratio plotted against total cattle slaughter for 1959 through 1969 (fig. 3) indicates a decline in the profitability of the cattle industry. This trend and the fluctuations around the trend are consistent with the decline in area devoted to forages and with the changes in animals slaughtered.

The decline in the parity price index 18/ further substantiates the declining relative profitability of the cattle industry over the 1960's, and is consistent with the decline in forage area during the same period (table 13). Corn remained closer to an index value of 100 in the 1960's than any other major commodity--a possible stimulus for the increase in area planted to corn. The index for all commodities generally decreased in the 1960's. The greatest decreases were for sunflower, flax, oats, and wheat.

Table 13.--Argentine farm price parity indexes for selected commodities, 1959-69
(1960=100)

Year	Wheat	Corn	Rye	Barley	Oats	Flax	Sunflower	Cattle
1959	95	110	112	107	133	133	146	119
1960	100	100	100	100	100	100	100	100
1961	113	114	117	100	87	122	124	85
1962	117	125	153	149	128	116	93	78
1963	127	133	178	132	135	109	121	88
1964	115	103	117	97	92	96	130	128
1965	85	108	97	101	81	79	93	123
1966	92	91	98	110	100	80	86	93
1967	98	95	99	94	83	80	70	82
1968	87	84	82	78	78	88	74	78
1969	72	100	100	82	82	96	86	77
1960-64	114	115	133	115	108	108	113	96
1965-69	87	96	95	93	85	84	82	91

Source: (2, 1960-70).

17/ A peak in the input/wheat price index indicates poor economic conditions for wheat. A trough indicates good economic conditions.

18/ An index value of less than 100 indicates that the parity price (an earlier price used as a base) was greater than the current price of a particular commodity relative to the current costs of inputs.

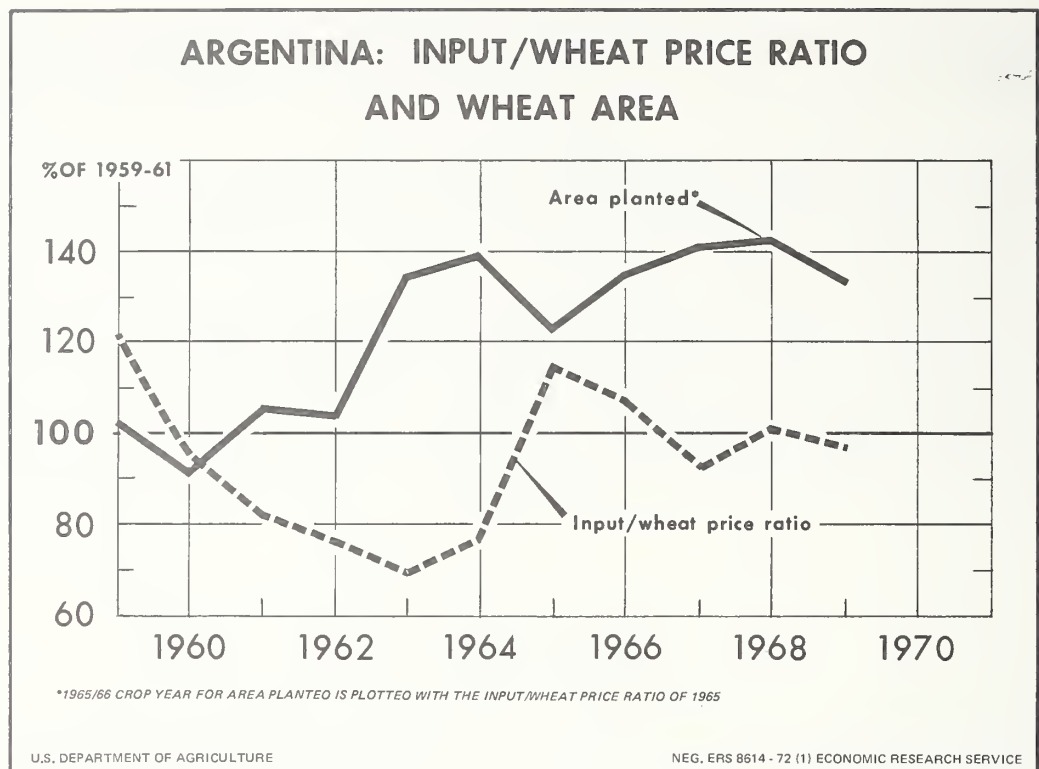


Figure 2

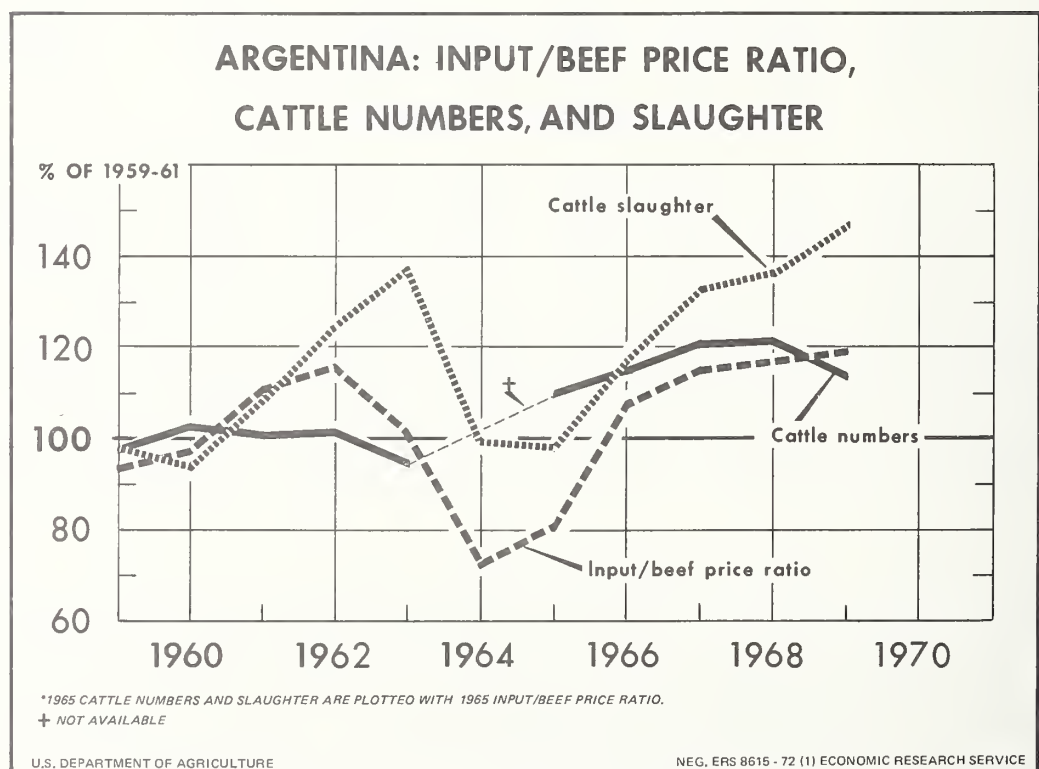


Figure 3

Production costs.--A comparison of income and cost data computed by the Secretaria de Estado de Agricultura indicates that production costs per hectare for the major grains and oilseeds in Argentina generally increased in real terms during the 1960's (app. table 12). Average 1965-69 production costs per hectare for wheat increased 1 percent from the 1962-64 average. Production costs per hectare for corn increased 6 percent.

Wheat costs more to produce per ton than corn. This was true even in the beginning of the 1960's, when operating costs for corn were higher than they are now and wheat costs were lower than at present (tables 14 and 15). Operating costs per ton are

Table 14.--Annual operating costs for selected agricultural commodities, Argentina, 1962-70 1/

Year	Wheat	Corn	Flaxseed	Sunflower
<u>1965 pesos per metric ton</u>				
1962. . .	6,037	5,434	9,464	9,330
1963. . .	5,278	5,433	10,204	9,843
1964. . .	5,451	5,364	9,910	9,846
1965. . .	5,647	5,465	9,249	9,782
1966. . .	4,983	4,856	8,840	9,323
1967. . .	6,936	4,481	9,407	8,131
1968. . .	6,117	n.a.	n.a.	n.a.
1969. . .	8,282	5,358	n.a.	n.a.
1970. . .	6,302	4,866	9,743	10,871
<u>1965 dollars per metric ton <u>2/</u></u>				
1970. . .	37.51	28.96	57.99	64.71

1/ Based on operating costs per hectare given in table 15 divided by national average yields per hectare. 2/ Converted at rate of 168 pesos per dollar.

greater for oilseeds than for wheat or corn. On a per hectare basis, corn costs more to produce than wheat, while flax costs less to produce than wheat and corn. Although production costs differ in absolute terms by region, they appear to maintain the same position relative to wheat in each region. A comparison of operating costs (costs of cultivation, harvesting, and interest on working capital) indicates that corn has the greatest costs per hectare in both the Balcarce and Pergamino areas (table 16). In the Pergamino area, operating costs per hectare for corn amounted to 136 percent of the wheat costs. In the Balcarce area, where wheat is the predominant grain, the ratio was lower--125 percent of wheat costs.

Absolute costs of corn and wheat production were higher for the Balcarce area, which harvested in bags. The Pergamino area harvested in bulk. After deducting costs of bags and string from harvesting expenses in the Balcarce area, the Pergamino area becomes a slightly higher cost area.

In Pergamino, corn costs more to market per hectare than wheat. A major reason is that more corn is dried artificially. Also adding to the higher per hectare cost is the higher yield per hectare for corn. Transportation and handling costs per ton are the same for corn and wheat (table 17).

Table 15.--Annual income and operating costs for selected agricultural commodities, Argentina, 1962-70

Crop and expenses	: 1962	: 1963	: 1964	: 1965	: 1966	: 1967	: 1968	: 1969	: 1970
	1965 pesos/hectare								
<u>Wheat</u>	:								
Seeding & harvesting <u>1/</u>	: 3,408	3,787	4,272	5,044	2,938	3,820	2,272	2,231	2,366
General expenses <u>2/</u>	: 2,353	2,131	2,180	2,614	2,209	2,471	3,334	3,207	3,466
Depreciation <u>3/</u>	: 539	468	485	453	366	380	700	733	721
Marketing & transport	: 1,518	1,648	1,649	2,252	1,070	1,639	1,401	1,970	1,967
Total operating costs:	7,818	8,034	8,586	10,363	6,583	8,310	7,707	8,141	8,520
Gross returns <u>4/</u>	: 12,107	13,510	13,971	13,127	9,355	13,052	11,913	9,540	13,792
Net returns	: 4,289	5,476	5,385	2,764	2,772	4,742	4,206	1,399	5,272
<u>Corn</u>	:								
Seeding & harvesting <u>1/</u>	: 4,588	4,088	4,766	4,168	5,228	5,385	n.a.	2,883	3,301
General expenses <u>2/</u>	: 2,932	2,554	2,453	3,199	2,867	2,940	n.a.	3,913	4,375
Depreciation <u>3/</u>	: 717	645	598	598	380	388	n.a.	800	785
Marketing & transport	: 2,055	1,667	1,843	1,806	1,967	2,338	n.a.	2,741	2,771
Total operating costs:	10,292	8,954	9,660	9,771	10,442	11,051	n.a.	10,337	11,232
Gross returns <u>4/</u>	: 18,494	16,145	13,856	14,117	16,871	26,625	n.a.	21,239	27,239
Net returns	: 8,202	7,191	4,196	4,346	6,429	15,574	n.a.	10,902	16,007
<u>Flaxseed</u>	:								
Seeding & harvesting <u>1/</u>	: 2,908	2,960	2,817	3,036	2,155	3,246	n.a.	n.a.	3,378
General expenses <u>2/</u>	: 2,359	2,285	2,298	2,512	2,091	2,480	n.a.	n.a.	3,183
Depreciation <u>3/</u>	: 565	492	512	468	379	392	n.a.	n.a.	728
Marketing & transport	: 774	772	656	939	397	656	n.a.	n.a.	594
Total operating costs:	6,606	6,509	6,283	6,955	5,022	6,774	n.a.	n.a.	7,883
Gross returns <u>4/</u>	: 12,371	10,584	8,572	9,313	6,427	11,117	n.a.	n.a.	12,734
Net returns	: 5,765	4,075	2,289	2,358	1,405	4,343	n.a.	n.a.	4,851
<u>Sunflower</u>	:								
Seeding & harvesting <u>1/</u>	: 2,306	2,209	2,445	2,768	3,126	3,072	n.a.	n.a.	3,083
General expenses <u>2/</u>	: 2,788	2,554	2,411	3,030	2,761	2,894	n.a.	n.a.	3,996
Depreciation <u>3/</u>	: 594	489	469	474	347	333	n.a.	n.a.	761
Marketing & transport	: 1,011	772	858	1,025	889	1,035	n.a.	n.a.	1,357
Total operating costs:	6,699	6,024	6,183	7,297	7,123	7,334	n.a.	n.a.	9,197
Gross returns <u>4/</u>	: 9,824	9,449	10,872	9,551	10,632	12,978	n.a.	n.a.	16,122
Net returns	: 3,125	3,425	4,689	2,254	3,509	5,644	n.a.	n.a.	6,925

1/ Includes seed, land cultivation expenses, herbicides, insecticides, and harvesting expenses. 2/ Includes land tax, repairs, hired labor, social benefits, insurances, and other expenses. 3/ In crop year 1968/69, a system of more rapid depreciation allowances replaced the system of tax deductions wherein the purchase price of machinery, or part of it, was allowed as an income tax deduction. This change at least partially explains the increased depreciation values after 1967. 4/ Gross returns = market price, Buenos Aires, multiplied by yield per area planted. Area planted is used as a base for yield since operating costs are on that basis. Gross returns in this table are therefore not consistent with gross returns per hectare given in table 10.

Source: (69).

Table 16.--Production costs per hectare for given yields of selected agricultural products in two areas of Argentina, 1969/70

Production expenses for given yields	Wheat		Corn		Flax		Sunflower	
	(1,800 kgs./ha.)		(3,500 kgs./ha.)		(1,000 kgs./ha.)		(1,000 kgs./ha.)	
	Pergamino	Balcarce	Pergamino	Balcarce	Pergamino	Balcarce	Pergamino	Balcarce
	Current pesos							
Rent and conservation.	6,000	3,500	6,000	3,500	6,000	3,500	6,000	3,500
Operating cost	7,360	6,400	7,350	6,680	7,104	7,825	6,405	4,050
Plow	1,500	1,100	1,500	1,200	1,500	1,200	1,500	1,200
Disc	750	700	750	700	750	700	750	750
Harrow	500	700	500	700	500	n.a.	500	n.a.
Seed	800	700	750	700	800	750	750	700
Spray	270	n.a.	n.a.	n.a.	270	n.a.	400	n.a.
Other	n.a.	n.a.	1/1,500	1/800	n.a.	n.a.	1/1,500	1/800
Seeds	2,300	2,420	1,840	1,800	3,180	4,225	350	600
Herbicides	240	780	240	780	104	700	2/915	n.a.
Harvesting cost.	3,762	6,362	7,875	9,488	6,340	5,075	2,450	4,696
Mechanical harvesting.	3,312	2,400	7,000	3,900	3,434	2,400	2,200	2,200
Material costs	n.a.	2,802	n.a.	5,604	1,556	1,680	n.a.	2,223
On farm movements.	450	410	875	1,102	250	245	250	273
Other	n.a.	3/750	n.a.	n.a.	3/1,100	3/750	n.a.	n.a.
Interest on circulating capital.	600	721	734	732	668	782	513	537
Marketing cost	4,852	n.a.	11,079	n.a.	3,800	n.a.	3,576	n.a.
Transport from farm to station	548	n.a.	1,065	n.a.	254	n.a.	378	n.a.
Transport to port.	2,315	n.a.	4,501	n.a.	1,286	n.a.	1,588	n.a.
Loading and unloading.	702	n.a.	1,365	n.a.	520	n.a.	550	n.a.
Commission	990	n.a.	1,925	n.a.	1,150	n.a.	850	n.a.
Taxes	297	n.a.	473	n.a.	280	n.a.	210	n.a.
Other	n.a.	n.a.	4/1,750	n.a.	5/310	n.a.	n.a.	n.a.
Total cost	22,574	n.a.	33,038	n.a.	23,912	n.a.	18,944	n.a.
Total cost less rent	16,574	n.a.	27,038	n.a.	17,912	n.a.	12,944	n.a.
Total cost less rent and marketing	11,722	13,483	15,959	16,900	14,112	13,682	9,368	9,283
Total cost less rent and marketing per metric ton.	6,512	7,490	4,560	4,694	14,112	13,682	9,368	9,283
Index of total cost less rent and market- ing relative to wheat:								
Per hectare	(100)	(100)	(136)	(125)	(120)	(101)	(79)	(68)
Per metric ton.	(100)	(100)	(70)	(72)	(216)	(178)	(143)	(123)

1/ Weeding and hilling. 2/ Insecticide. 3/ Swathing. 4/ Artificial drying. 5/ Handling and movement of bags.

Sources: Pergamino (44); Balcarce (11).

Table 17.--Marketing costs for selected agricultural products, Argentina, 1969/70

Operation	Corn	Wheat	Flax	Sunflower
	Current pesos per metric ton			
Transportation:				
From farm to station (10 km.) . . .	254	254	254	327
From station to port (200 km.) . . .	1,286	1,286	1,286	1,588
Loading and unloading of grain <u>1/</u> . . .	440	440	830	600
Commission	550	550	1,150	850
Taxes	135	165	280	210
Other	<u>2/</u> 500	n.a.	n.a.	n.a.
Total	3,165	2,695	3,800	3,575

1/ Includes all labor entailed in marketing except loading and unloading of grain. Figure for flax is much greater because harvesting was in bags rather than bulk, thus adding to labor charges. 2/ Artificial drying.

Source: (44).

The income/cost ratio for wheat was 1.62 in 1970--indicating that for every peso invested in operating costs per hectare, 1.62 pesos were returned (table 18). 19/ The ratio for wheat had declined over the 1960's from a 1962-64 average of 1.62 to a 1965-69 average of 1.40. Although not consistent with the increase in area planted to wheat during the 1960's, it is consistent with the increase in area not harvested. Although the area planted to wheat increased, higher beef prices and the declining income/cost ratio for wheat probably caused more wheat to be used as a forage crop.

Table 18.--Ratios of gross income to operating costs for selected agricultural products, Argentina, 1962-70

Year	Wheat	Corn	Flaxseed	Sunflower
1962.	1.55	1.80	1.87	1.47
1963.	1.68	1.80	1.63	1.57
1964.	1.63	1.43	1.36	1.76
1965.	1.27	1.44	1.34	1.31
1966.	1.42	1.62	1.28	1.49
1967.	1.57	2.41	1.64	1.77
1968.	1.55	n.a.	n.a.	n.a.
1969.	1.17	2.05	n.a.	n.a.
1970.	1.62	2.43	1.62	1.75

Source: Computed from data in table 15.

19/ The net returns per hectare listed in table 15 indicate the same degree of profitability.

The 1970 income/cost ratio for corn was 2.48, indicating a greater return from corn per peso invested than for wheat. The ratio for corn increased during the 1960's, evidence of corn's improving economic position.

The ratios for oilseeds declined in the mid-1960's, especially for flaxseed. They appear to have increased over the latter half of the decade, although ratios for 1968 and 1969 were not available. Ratios for sunflower were generally greater than those for flaxseed, consistent with the decline in area planted to flaxseed and the increase in area planted to sunflower.

No data were available from the Secretaria de Estado de Agricultura y Ganaderia on operating costs per hectare for grain sorghum; however, they are somewhere between those for wheat and corn. Grain sorghum yields are close to those of corn, but the amount of labor and materials used in their cultivation is less. Returns per hectare for grain sorghum increased during the 1960's, and in the latter half of the decade surpassed returns per hectare of wheat (table 10). The ratio of gross income to operating costs per hectare probably increased for sorghum during the 1960's. In the latter half of the decade, sorghum probably had an income/cost ratio greater than that for wheat, which would be consistent with the steady increase in area planted to sorghum.

Changes in Technology

Argentine farmers use many production practices common in developed countries with extensive agriculture, such as Australia, Canada, and the United States. Among these are a high degree of mechanization, at least in grain production in the Pampa; wide use of improved seeds and cattle breeds; improved pastures; use of herbicides; and improved soil tilling methods. Yet yields, particularly in grains, have increased slowly and remain relatively low. Among the various reasons is the highly variable weather of the Pampa region, which causes wide fluctuations in yields from year to year. Also important is the fact that technological changes adopted in Argentina have been geared to the established structure of the countryside. Because large land holdings and relatively low land costs predominate, the technological changes have been geared to extensive agriculture (table 5). At the same time, costs of inputs associated with modern farming--such as for fertilizers, other chemicals, and machinery -- have remained relatively high, making their wider use uneconomical (61, 36).

Trends in Grain Yields

Average grain yields per harvested hectare in Argentina are low relative to those in the United States. The potential for higher yields appears to be large, and yields are increasing. Gains in wheat have been due to the introduction of improved seed varieties, which at present cover almost all wheat plantings (61), as well as to mechanization, which has brought about better soil preparation and more timely planting and harvesting. Two hybrid semi-dwarf wheat varieties recently developed at the Marcos Juarez experimental station may affect yields after the mid-1970's. Hybrid corn varieties were introduced in the 1960's, increasing yields in the second half of the decade. Over 80 percent of corn area is now sown with hybrid varieties (table 19). Although sorghum is a relatively new crop in Argentina, improved varieties account for about 50 percent of area planted. Improved seeds are used on less than 2 percent of area planted to barley, oats, and rye (33).

Trends in Livestock Productivity

Cattle production in Argentina is extensive, with many ranches grazing herds on natural or permanent seeded ranges and providing little more than strong fences. The technology of cattle production is primarily concerned with maintenance of quality in

Table 19.--Selected indicators of technological change in Argentine agriculture, 1960-70

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 ^{1/}
Hybrid seed: <u>2/</u>											
Corn: Production (1,000 tons)	11.1	16.5	20.2	33.3	41.3	44.6	55.2	47.2	43.0	60.9	75.0
Percent of total corn area seeded	20	28	33	53	49	65	76	61	52	71	87
Sorghum grain: Production (1,000 tons)	2.6	4.4	3.3	5.0	4.3	6.1	6.6	66.5	4.7	14.8	18.0
Percent of total sorghum area seeded	26	33	22	34	25	35	35	32	18	49	50
Tractors:											
Production (1,000 units)	20.2	14.7	11.7	11.4	13.1	13.6	11.3	9.5	9.8	9.0	10.8
Sales (1,000 units)	13.2	16.8	11.2	12.1	15.1	13.7	9.6	10.0	11.0	9.5	10.8
Stocks (1,000 units)	7.2	5.1	5.6	4.9	2.8	2.7	4.2	4.0	2.8	2.3	2.3
Total number in use (1,000 units)	75.2	85.1	94.5	104.7	108.7	110.7	122.4	126.4	127.9	130.1	131.3
Average horsepower of tractors sold	47.7	50.6	51.6	50.7	49.5	51.8	53.7	52.2	57.7	57.5	60.3
Combines:											
Number registered (1,000 units)	28.7	29.1	29.4	29.9	30.4	29.9	n.a.	n.a.	n.a.	n.a.	n.a.
Fertilizers: <u>3/</u>											
Use (1,000 tons of nutrients)	12.6	16.0	20.0	13.4	33.9	45.9	45.6	50.1	51.9	59.0	n.a.
Imports of pesticides (1,000 tons) . . . . .	.8	1.3	1.1	2.6	5.3	2.5	1.2	2.0	2.7	2.4	n.a.
Production of insecticides and herbicides: <u>4/</u>											
HCH (1,000 tons)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.6	2.2	1.8	2.0	1.4
DDT (do.)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.6	.5	1.1	1.3	1.2
2-4D (do.)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.4	1.1	1.2	1.2	1.4

^{1/} Provisional. ^{2/} Crop years; i.e., 1960=1959/60. ^{3/} Nitrogen, phosphate, and potassium. ^{4/} Hexachloreycyclohexane (HCH), dichlorodiphenyltrichloroethane (DDT), and 2-4 dichlorophenoxyacetic acid (2-4D).

Sources: Tractors: production, sales stocks, and average power (16); production of insecticides and herbicides, imports of fertilizers, corn and sorghum grain seeds, total number of tractors in use, fertilizers used, and imports of pesticides (51); combines, number registered (73).

breeding herds and improvement of pastures. The latter has received the more attention in INTA's experimental stations, 20/ and considerable success has been achieved in the Pampa region in spreading the results. Two types of operations predominate in beef cattle production. One is beef cattle breeding on natural or permanent seeded pasture, which predominates in southern and eastern Buenos Aires Province, Entre Rios Province, and to a lesser extent, Misiones Province. The other is cattle finishing on fattening pastures (alfalfa and grass mixture), centered in northwestern Buenos Aires, southern Sante Fe, and southeastern Cordoba Provinces.

A principal characteristic of Argentine beef cattle operations is the absence of grain or supplements in cattle rations, except on a small scale to carry over essential breeding stock during severe winters. This practice is partly explained by the mild, snow-free winters in the Pampa and northern Argentina. Pastures there remain usable, although with a reduced amount of grass and nutritive content. Furthermore, since ranches in the Pampa are usually mixed operations (grain-livestock), cattle are grazed during the winter on the fall-seeded grains (barley, oats, rye, and wheat).

The principal beef breeds in Argentina are Aberdeen Angus, Shorthorn, and Hereford. Zebu, Charolais, and Santa Gertrudis are being introduced (62, p. 102 ff; 43, p. 35 ff.).

The potential for expanding beef production is great. The carrying capacity of pastures in the Pampa region could be doubled by converting natural pastures to seeded pastures. Beef production could be increased even further with supplementary winter feeding and extended control over ticks and such diseases as aftosa and brucellosis.

Estimated carrying capacity of cattle in the Pampa region is 0.6 to 1.0 animal unit 21/ per hectare on natural pastures, 1.2 to 1.8 units on improved pastures, and 1.8 to 2.2 on seeded temporary pasture (fig. 4). Experimental fattening operations on improved pastures with rotational grazing have resulted in 2.4 to 3.0 units per hectare, and when supplementary winter rations have been used (hay, silage, or grain), up to 3.7 units. The present carrying capacity of pastures results in meat output of 100 to 150 kilograms per hectare. Better pasture management could increase output to 300 kilograms and use of rotational grazing and winter feed supplements to 500 kilograms (46, p. 2; 43, p. 42). Present beef output is further limited by the relatively low calving rate, which is about 72 percent of breeding cows (compared with 90 percent in the United States); high mortality of calves; and a slaughter rate of only 25 percent (46, p. 2; 43, p. 37).

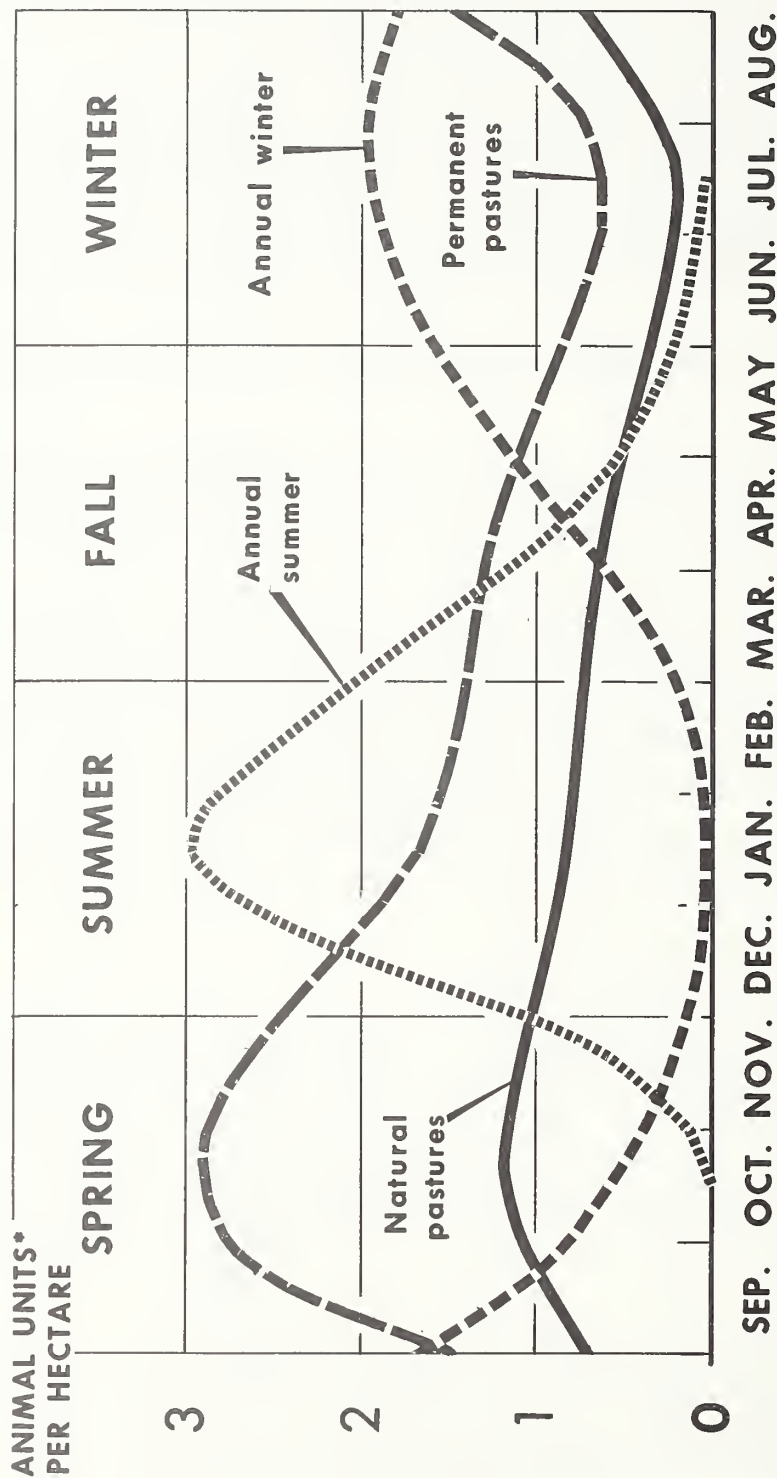
Trends in Input Use and Management Practices

Mechanization.--Argentine agriculture, concentrated on the large Pampa plains, is well suited to extensive mechanization. The number of tractors in use reached 75,000 units by 1960 and was over 131,000 by 1970. Their average size increased from 48 h.p. in 1960 to 60 h.p. in 1970 (table 19). The increase in tractors reduced the cultivated area per tractor from 873 hectares in 1947 to 187 hectares in 1965. The present ratio is not impressive compared with the U.S. ratio in 1965 of 43 hectares; it compares more favorably with the ratio of 102 hectares in Canada and 116 hectares in Australia during the early 1960's (53, pp. 114-116).

20/ INTA is the National Institute for Agricultural Technology (Instituto Nacional de Tecnologia Agropecuaria).

21/ Animal unit = 1 steer or cow of 400 kilograms; 1 heifer = 0.7 AU; 1 bull = 1.3 AU; 1 weaned steer calf = 0.5 AU; 1 cow with calf = 1.2 AU to 1.5 AU depending on weight of calf (3, p. 31).

ARGENTINA: CARRYING CAPACITY OF THE PAMPA PASTURES



SOURCE: ADAPTED FROM DATA GIVEN IN (43)

*FOR DEFINITION OF ANIMAL UNITS, SEE PAGE 39

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Figure 4

The Argentine Government has been instrumental in influencing the mechanization of agriculture. After 1955, high duties were imposed on imports of tractors and farm equipment. Domestic industry was further assisted when the Government allowed farmers to deduct part or all of the price of machinery from income taxes due. In 1969, this system of tax credits was replaced by a rapid depreciation schedule. While the first system favored the addition or replacement of machinery, the second favors the repair of existing units (16, p. 205).

The Argentine farmer pays much more for his equipment than farmers in some other major agricultural countries. If payment were made in wheat, he would pay over 90 percent more for a tractor than a U.S. farmer and about 120 percent more than an Australian farmer. In terms of beef, he would pay at least three times as much as a U.S. farmer and over five times as much as a German farmer (table 20). Overcapacity and consequent high unit costs characterize Argentina's agricultural machinery industry. In 1968, tractor factory capacity was about 45 percent utilized; the rate for other agricultural machinery factories ranged from 33 percent (plows) to 80 percent (harrows) (table 21). Of the original seven tractor factories in Argentina in 1960, four are still in production. 22/

Table 20.--Cost of a tractor in selected countries in terms of dollars, wheat, and beef 1/

Country	Dollars	Wheat	Beef on hoof
		<u>Metric tons</u>	
Argentina.	6,165	143.3	31.5
United States.	4,495	74.9	9.2
Germany.	4,247	39.3	6.1
Australia.	4,048	64.3	n.a.

1/ 1969 prices for Argentina and 1965 prices for other countries.

Source: (15, p. 61).

22/ The 4 tractor firms are FIAT, Reinstahl Hanomag (HANOMAG), Deutz y la Cantabrica (DECA), and John Deere.

Table 21.--Capacity and utilization of factories manufacturing agricultural machinery and spare parts in Argentina, 1968

Machinery type	: Number of : factories	: Annual : capacity : (number)	: Annual : production : (number)	: Percent of : capacity : utilized
Tractors.	: 4	22,000	9,800	45
Harvesters.	: 19	3,500	1,600	46
Foragers.	: 23	2,000	1,500	75
Drills.	: 63	12,000	7,200	60
Plows	: 66	18,000	6,000	33
Harrows	: 54	10,000	8,000	80
Cultivators	: 11	2,000	1,100	55
Dryers.	: 10	700	350	50
Silos	: 38	20,000	6,000	30
Sprayers.	: 40	10,000	8,000	80
Milking machines.	: 5	2,500	1,250	50

Source: (15, p. 57).

Fertilizers, herbicides, and pesticides.--Use of fertilizers in Argentina is low compared with use in other countries. The 1969 rate of application was about 2 kilograms per hectare of land planted to crops, forages, vegetables, and fruits. This contrasts with 48 kilograms in Canada, 124 in the United States, and about 150 in Australia. Intensively cultivated crops--such as sugarcane, fruits, and vegetables--are generally grown outside the Pampa region on irrigated lands and are fertilized to some extent. However, only 1 percent or less of wheat, corn, and pasture was fertilized in 1968 (table 22). No fertilizers have been applied to sorghum.

Table 22.--Estimated use of fertilizers in Argentina, 1968

Crop	: Area fertilized :	: Percent of total : seeded area
	: <u>1,000 hectares</u>	
Intensive cultivation:	:	
Sugarcane.	: 110	60.0
Tobacco.	: 20	32.0
Vineyards.	: 75	26.0
Apples and pears	: 30	40.0
Citrus fruits.	: 32	25.0
Other fruits	: 10	20.0
Potatoes	: 5	33.0
Onions and garlic.	: 15	66.0
Other vegetables	: 30	25.0
Extensive cultivation:	:	
Wheat.	: 60	1.0
Corn	: 10	.2
Pastures	: 50	.6

Source: (15, p. 59).

Pampa soil has produced sufficiently well at traditional levels of returns and costs, and there has been little pressure on land. These conditions in conjunction with relatively high fertilizer costs have retarded fertilizer use in Argentina (table 23). The cost of fertilizers relative to normal market prices of grain is such as to allow little margin for risk of a bad crop caused by adverse weather. The high cost of fertilizers is mainly due to the high duties on imports--which make up 90 percent of all fertilizers. Import duties on fertilizer imports were partially reduced after 1963. In 1968, a commercial liquid nitrogen plant (Petrosur) began production to satisfy most of the domestic demand for nitrogen fertilizers. To encourage domestic fertilizer plants, the Government has maintained high duties on nitrogen imports. Argentina lacks appreciable mineral deposits to produce the two other principal fertilizer elements, phosphorus and potassium.

Table 23.--Cost of fertilizers in selected countries in terms of kilograms of fertilizers that can be purchased with 1 metric ton of wheat

Country	Nitrogen (N)	Phosphate (P ₂ O ₅)	Potassium (K ₂ O)
		<u>Kilograms</u>	
Argentina.	174	187	300
United States.	249	299	561
Australia.	299	488	543
Italy.	462	647	1,059

Source: (15, p. 61).

The improved grain varieties developed in INTA experimental stations were intended to respond to the climate and soil of the Pampa, and not to fertilizers. Fertilization experiments with existing grain varieties on INTA experimental stations or on large ranches gave inconclusive results. ^{23/} In both cases, the soil was good, with a high content of organic matter (over 3.5 percent). The practice on farms with such soil is to seed and harvest a crop on a plot of land one year, then seed it with a mixture of alfalfa and grass and keep it under pasture for 3 to 5 years. Remaining rested, these soils have shown little response to fertilizers. On the other hand, recent experiments on small farms (particularly those under 150 hectares), which are much more intensively cultivated, have shown a positive response to fertilizers. But the results have not spread beyond experimental stations. Even when small farmers know enough about fertilizer use, they may not be able to obtain capital to buy fertilizers. Recent decreases in fertilizer prices and the slow increase in the price of land may make fertilizer use economical, particularly on farms more intensely cropped for many years, such as in Cordoba and Corrientes Provinces (61, p. 10; 36).

Herbicides are in fairly common use in Argentina, particularly for corn. The rarity of frosts prior to corn harvest makes their use necessary to prevent heavy

^{23/} INTA stations have generally been established on lands which formerly belonged to large ranches.

growth of weeds which would make harvesting difficult. Herbicide use for wheat and sorghum is less than for corn, and very little is used for pastures. Pastures tend to be heavily infested by weeds, but farmers try to control them mechanically. Over 50 percent of farms in the Pampa region use herbicides, varying from 26 percent in cattle-breeding areas to 90 percent in corn areas.

Insecticides and pesticides, used very little for grains, are in common use in livestock management. However, in 1969, use of chlorinated insecticides--hexachloro cyclohexane, dieldrin, endrin, heptachlor, and products with similar chemical composition--has been forbidden in pastures under pressure of importers of Argentine meat. Before 1969, up to 95 percent of the use of these pesticides was for livestock and pastures. All these chemicals are domestically produced (61, p. 11; 53, p. 116; 16, p. 243; 37, p. 29, 1969 issue). 24/

Cultivation practices and soil conservation.--Although grain production is mechanized from planting through harvesting, adoption of improved soil cultivation practices has been slow. INTA's efforts to stimulate adoption of these practices are not yet widely felt. The difficulty seems to be the dissemination of available knowledge and the willingness and ability of farmers, particularly small ones, to adopt new methods. Shallow plowing; late preplant land preparation; uneven, insufficient, and late seeding; overgrazing by cattle; and insufficient summer fallowing are still widespread. On small farms, cattle are grazed on stubble for too long a time, a practice which prevents conservation of moisture and causes late land preparation and late seeding. In Corrientes, late seeding is also caused by double cropping (corn following small grains), which prevents proper land preparation. Early seeding is being generally adopted for corn to help improve yields. Although use of hybrid seed has been generally accepted, some farmers still use open-pollinated seed. Changes in soil cultivation practices could increase yields significantly, and experiments with such practices at the Parana experimental station in Corrientes Province seem to prove that such changes are economically profitable (22, p. 11; 4, pp. 45-47; 1).

The Argentine livestock sector is built on natural pastures. These are non-seeded range, but since almost all land in the Pampa has been plowed at some time and grazed extensively, the botanical composition of native pasture has varied. Wild alfalfa and mixed seeded pastures are included in the native pasture category, although they have a higher carrying capacity than the real native range. The more valuable native pastures are fescue, harding, bermuda, and dallis grasses and clovers.

The Pampa region, with approximately 55 million hectares of arable land, has 36 million under pastures; 22 million hectares are still natural pasture, and the remaining 14 million are under alfalfa, sorghum grass, and other summer or winter forage crops (53, p. 118). Use of improved seeded pastures has been spreading. Their carrying capacity is twice that of natural pastures.

In 1967, the Argentine Bank of the Nation and the World Bank initiated a livestock development program that provides supervised credit and technical assistance to producers. The purpose is to encourage producers (1) to convert natural pastures to improved pastures, (2) to renovate old seeded pastures by reseeding and fertilization, and (3) to rely more on forage crops. A higher reliance on forage crops will provide better distribution of forage throughout the year, and cultivation of legumes will return nitrogen and organic matter to the soil (24, pp. 71-79; 53, p. 113; 43, pp. 39-43).

24/ Producing firms are Cia. Quimica, Electroclor, Indupa, Atanor, and Sintesis Quimica.

Although soil exhaustion is not a serious problem in Argentina except on small farms which have been in long intensive use, wind and water erosion is becoming a problem. The Argentine Institute of Soil and Agronomy has reported that about 16 million hectares in the Pampa region are affected by erosion; 6 million of these are approaching the point of total loss (53, pp. 117-118). Another source estimates the total area affected by soil erosion in the whole country at 33 million hectares (10, pp. 41-43). Wind erosion affects the dry zone of the Pampa region--western Buenos Aires, southeastern Cordoba, eastern La Pampa, and San Luis Provinces. Water erosion is most severe in Misiones Province. Apart from the Institute's study of the problem, nothing seems to have been done to renovate the eroded lands or to prevent the spread of erosion. No Government funds seem to be available for this purpose. This means productivity in some areas will be lowered by erosion.

V. GOVERNMENT POLICIES AND MAJOR MARKETING INSTITUTIONS

General Government Policies

Because of frequent changes in Argentina's agricultural policies, an evaluation of their impact on grain and livestock production cannot be as precise as would be desired. Since June 1966, there have been three military presidents and a succession of Ministers of Economy and Secretaries of Agriculture. The generally announced Government goals for the agricultural sector include continued expansion of agricultural exports; reasonably stable consumer prices; favorable prices for farmers; expanded agricultural production; and better utilization of existing land resources. General goals for the total economy which directly or indirectly affect agriculture include stimulation of industrial development, protection of domestic industries, and minimization of inflation. Policies to achieve these goals have changed frequently and in ways not always consistent with what is needed to meet each individual goal.

Policies to stimulate industrial development or to meet recurring domestic financial crisis may have inhibited investment in agricultural capital and the application of modern technology to farming. The protection of domestic industry results in high costs for farm inputs.

The Government's anti-inflation programs have been important in a series of economic measures designed to establish a base for sustained economic progress. A key measure in one anti-inflation program was the 27-percent devaluation of the peso in March 1967, done to give a strong incentive to production of export commodities. Simultaneously, the Government relaxed import barriers to further reduce the costs of imported goods and create more competition as a means of stimulating industrial efficiency. To reduce inflation, it reduced the budget deficit, tied wage increases to productivity, and established a price control program supplemented by voluntary cooperation of large firms (22, pp. 26-27).

At present, however, strong nationalistic policies prevail and rapid inflation has returned. The Government further devalued the exchange rate 12.5 percent in June 1970 and adopted a policy of small devaluations in April 1971. Since then, a series of small devaluations have occurred. In the late 1960's, the Government granted income tax credit for purchases of agricultural inputs such as tractors or grain storage silos, but these were eliminated in 1969 in favor of larger depreciation allowances. In addition, the Government periodically gives income tax credits for the sale of cattle above a certain weight in the Liniers and Rosario markets. They are sometimes removed or adjusted as the Government sees fit.

Taxes

The agricultural sector is affected by four basic taxes--export, sales, land, and income. The first two provide the most revenue to the Government.

Export taxes for grains are of two types, "special purpose" and "export retention." Both are based on an export index price set by the Government. Special purpose taxes consist of a 1.5-percent tax for administrative expenses of the National Grain Board, a 1.5-percent tax for research, and a 1.0-percent tax for construction of storage and marketing facilities (table 24). For export sales of wheat, barley, and oats, the Government collects an additional 1.0-percent tax for highway construction and a 0.3-percent tax for statistical services. These taxes total 5.3 percent for wheat, barley, and oats and 4.0 percent for corn and sorghum.

Table 24.--Argentine special-purpose export taxes as of February 1971

Commodity	Special-purpose taxes					
	: Export :					
	: index : : value :	: Research : : 1/ :	: Grain : : Board :	: Elevator : : construction :	: Highway : : construction :	: Statistical : : services :
	:Dollars :per m.t.	- - - - -Percent- - - - -				
Wheat (bread)	: 60	1.5	1.0	1.5	1.0	0.3
Wheat (durum)	: 57	1.1	1.0	1.5	1.0	.3
Corn.	: 62	1.5	1.0	1.5		
Sorghum . . .	: 50	1.5	1.0	1.5		
Oats.	: 57	1.5	1.0	1.5	1.0	.3
Barley. . . .	: 53	1.5	1.0	1.5	1.0	.3
Beef 2/ . . .	: 410	1.5				

1/ For research conducted by INTA (Instituto Nacional de Tecnologia Agropecuaria).

2/ Bone-in, forequarters (8 ribs), frozen.

Source: (64).

Export retention taxes are imposed on practically all exports of grains and livestock products as well as live animals. These were established to avoid windfall peso gains to exporters during devaluation of the peso. They have been decreased from their original levels of March 1967 for some commodities and are currently being reviewed for further reduction (table 25).

Producers and exporters claim the export retention system penalizes production and deters exports in times of a sluggish market. Since the export index price is supposedly based on the world market price, the return to the exporter after taxes is below the world price.

Sales taxes are applied to grains and livestock. Each Province levies taxes at the point of sale. The basic taxes on sales of livestock average about 2 percent. If one includes the 2.35-percent levy on livestock sales for the National Meat Board as a tax, the total sales tax is about 4 to 5 percent (46, p. 5).

In January 1969, an emergency land tax was enacted for a period of 3 years. Land tax payments were to be used as an advance payment on income taxes. The income was to be derived only from the use or lease of the same property upon which the land tax

Table 25.--Argentine export index values and export retention taxes, February 1967-71

Date	Wheat (Bread)			Wheat (Durum)			Corn			Sorghum			Beef ^{1/} (Frozen carcass)		
	Index : Reten- : value : tion : tax :	Per- cent	Dollars per m.t.	Index : Reten- : value : tion : tax :	Per- cent	Dollars per m.t.	Index : Reten- : value : tion : tax :	Per- cent	Dollars per m.t.	Index : Reten- : value : tion : tax :	Per- cent	Dollars per m.t.	Index : Reten- : value : tion : tax :	Per- cent	Dollars per m.t.
February 1967	59	0	63	0	0	55	0	0	47	0	0	390	0	0	
March 1967	59	25	62	25	25	50	25	25	45	25	25	382	25	25	
November 1967	59	18	62	18	18	50	25	25	45	25	25	367	18	18	
April 1968	55	18	60	18	18	47	18	18	41	18	18	367	18	18	
October 1968	2/59	6	3/65	6	6	45	18	18	39	18	18	367	15	15	
February 1969	59	6	65	6	6	45	8	8	39	8	8	367	12	12	
June 1969	59	6	65	6	6	51	8	8	39	8	8	367	12	12	
January 1970	59	6	63	6	6	51	8	8	39	8	8	367	12	12	
July 1970	59	17	57	17	17	48	19	19	39	19	19	367	20	20	
August 1970	59	17	57	17	17	52	19	19	43	19	19	410	20	20	
February 1971	60	17	57	17	17	62	19	19	50	19	19	410	5	5	

^{1/} Bone-in, forequarters (8 ribs), frozen.^{2/} \$56 per metric ton on sales to Pacific areas.^{3/} \$62 per metric ton on sales to Pacific areas.

Source: (64).

was paid. The tax was 1.6 percent of the fiscal value of land free of improvements. Though relatively small, this tax raised considerable criticism within Argentina. Most producer associations were unhappy with it. The stated purposes of the tax were to force the productive utilization of idle land and to help reduce income tax evasion. This tax was scheduled to be eliminated in January 1972. To further discourage the use of land as an inflation hedge, a new land tax was proposed in the 1970-74 development plan based on the potential productivity of the land rather than its tax assessed value (15).

To increase production, principally in the livestock sector, the Government has granted substantial income tax credits. In 1968, tax credits of 100 percent were permitted on inventory increases of cows and heifers to increase the breeding stock (42, p. 25). This breeding-stock increase had to be maintained over a 3-year period for the 100-percent credit deduction.

Tax credits have also been offered on steers, yearlings, and male calves carried to heavier export market weights. These credits are subject to change, based on supply and demand conditions. As of June 1970, they were on a sliding scale ranging from 20 (new) centavos to 5 centavos and applied to steers marketed at not less than 410 kilograms liveweight (58, June 1970, p. 831). 25/

Prior to 1968/69, tax credits of up to 100 percent on the cost of domestically produced equipment, pesticides, fertilizer, and certain other production-related expenses were allowed. These credits were limited to 60 percent of taxable farm income. If expenses exceeded income, deductions could be spread over a 3-year period (61, p. 31). Since 1969, however, this tax incentive system has been replaced by a more rapid depreciation allowance on agricultural machinery.

Credit

In Argentina, agricultural credit can be divided into three length-of-term categories: (1) Short-term--less than 3 years; (2) medium-term--3 or 4 years; (3) long-term--5 years and over. Because of the rampant inflation in Argentina through 1968, credit had been in short supply. However, since 1968, new programs developed by public and private banks, by nonbank institutions such as cooperatives, and by international banking institutions have assisted the Argentine Bank of the Nation to increase credit for farmers.

The official bank charged with serving the agricultural sector is the Bank of the Nation (Banco de la Nacion Argentina). It is the most important single source of credit funds for agriculture, although in recent years its percentage of agricultural credit has declined in favor of private banks, such as the Livestock Bank (Banco Ganadero) and the newly created Agricultural Cooperative Bank. Agriculture received an average of 20 percent of the total credit granted by public banks in the 1960's. Loans from public Provincial banks increased from about 20 percent of all agricultural loans during 1960-65 to about 34 percent during 1966-69. They are the most important creditors in Buenos Aires and Santa Fe Provinces (24, pp. 335-336; 56).

Agricultural loans are granted for specific capital needs, often for such specific operations as hiring of extra labor, renting of machinery, transport and storage, and seeding. Although the Bank of the Nation and the Provincial banks can lend up to 80 percent of the estimated cost, the actual amount is usually less, since credit is often in short supply. Interest rates on this type of loan range from 10 to

25/ Based on livestock sold from the Pampa areas. Market weight requirements were lower for cattle from other areas.

12 percent (61). Government banks have specific regulations concerning the length of term of loans and repayment procedures, and provisions concerning the proper use of loans.

The percentage of short-term credit granted increased and long-term credit decreased from the late 1950's through 1969 (24, p. 340). Availability of medium-term credit increased in the late 1960's.

The Argentine Bank of the Nation, in cooperation with international financial institutions, offers project-development loans to stimulate acquisition of tractors, silos, sheds, and other equipment. Some of its major special credit programs are:

(1) An agricultural technology program, started in 1963 in cooperation with the Inter-American Development Bank to aid purchases of agricultural equipment and machinery. The loans are granted for 5 years at an interest rate of 12 percent.

(2) A pasture improvement program, initiated in 1965 to increase beef production through improved pastures. The loans cover up to 80 percent of project loan costs for seeding and soil preparation. Repayment is over a $3\frac{1}{2}$ -year period.

(3) A livestock development program, established in 1967 in cooperation with the International Bank for Reconstruction and Development to aid producer financing of up to 80 percent of investments in pasture improvement, fencing, pasture consolidation, stock handling facilities, machinery, and breeding cattle. Loans are also made to agricultural contractors for financing 60 percent of the cost of farm machinery and equipment.

Other special credit programs are for (1) purchase of installations and equipment required for processing agricultural commodities; (2) fertilizer purchases; and (3) construction of storage elevators and grain silos in certain Pampa regions.

Until recently, loanable funds for these projects were underutilized because of organizational rigidities, difficulties of applicants in meeting loan criteria, and the disincentives toward investment in capital goods as a result of poor terms of trade, especially in the livestock industry. Current rapidly increasing beef prices on the world and domestic markets, a high rate of inflation, and an interest rate as low as 10 to 12 percent have stirred rancher interest in these loans.

Terms of loan repayment vary with the length of time linked with each specific purpose loan. For example, on a $3\frac{1}{2}$ -year loan for pasture improvement, the repayment schedule is 10 percent after $1\frac{1}{2}$ years, 15 percent after 2 years, 20 percent after $2\frac{1}{2}$ years, 25 percent after 3 years, and the remaining 30 percent at the end of the $3\frac{1}{2}$ -year period. This schedule is based on a 12- to 15-percent rate of interest (24, p. 334).

Transportation

The Argentine Government operates most transportation facilities, including railroads, ports and harbors, the national highway network, most air services, supplemental trucking services of the railroads, and a large ocean shipping line. It sets regulations covering vehicle registration, licenses, schedules, capacity, and freight rates.

Most grains move by truck or trailer from the farm to the local cooperative or registered grain merchant. From this point, over 70 percent of the grains are transported to the major markets by truck (24, p. 211). The larger cities, and specifically the port cities, are highly accessible by paved road, but the further the distance

from Buenos Aires or Rosario, the less adequate the road system becomes. Access roads to many major highways are gravel or dirt and in bad weather become impassable, causing serious breaks in supplies to the local markets (24, p. 211). Truck transportation in the northern Provinces and in Patagonia is adequate only in good weather. During 1966-69, trucks accounted for over 70 percent of the country's livestock transportation.

Grains and livestock accounted for over one-third of total rail transport from 1966 through 1969 (table 26). Wheat and corn compete occasionally for rolling stock, especially in years of extra large shipments to ports. This occurred in 1966, when wheat accounted for almost 15 percent of total rail transport. In normal years, such as 1968 and 1969, wheat accounts for about 10 percent. Livestock movements by rail comprised 6 percent of total rail movements in 1969.

Table 26.--Transportation of agricultural products by rail in Argentina, 1966-69

Product	1966	1967	1968	1969	1966	1967	1968	1969
	---Million metric tons---				-----Percent 1/-----			
Total rail traffic. . . .	22.0	16.8	19.8	20.9	100.0	100.0	100.0	100.0
Agriculture	8.4	5.3	6.7	6.8	38.2	31.5	33.5	32.4
Seeds . . . . .	.5	.1	.3	.5	2.1	.6	1.5	2.3
Oilseeds. . . . .	.2	.3	.3	.3	1.1	1.9	1.5	1.3
Wheat	3.3	1.6	2.1	2.2	14.8	9.5	10.7	10.4
Corn.	1.3	1.2	1.6	1.6	6.0	6.9	8.1	7.5
Other	1.5	1.2	1.2	.9	6.7	7.1	5.9	4.6
Livestock	1.6	.9	1.2	1.3	7.5	5.5	5.8	6.3

1/ Percents computed from unrounded data.

Source: (52).

Before 1967, rail transport was slow, causing excessive injury and loss of weight to livestock. During the early and middle 1960's, the slow and uncertain service--with large losses if grain was shipped bulk in the mostly antiquated rolling stock--was the principal cause of a decline in rail transport. 26/ Turnaround time at the ports was also excessive (20 days for freight cars) (75, p. 21). This has improved, although turnaround time is still slow for rail and trucks alike.

In general, Argentina's railroads have improved since the late 1960's. Labor productivity has been increased, the number of workers has been reduced through attrition, capital is used more efficiently, and improvements have been made in the quality and quantity of rolling stock and in loading and unloading facilities.

In 1960, the per ton rate for transport of wheat or corn from Pergamino to Buenos Aires was \$3.32 by rail and \$4.77 by truck (41, p. 9). In 1968, the rate was \$3.67 by rail and \$5.37 by truck (39).

26/ In 1961, an IBRD mission reported that the number of freight cars--90,024--was inadequate to meet demand, and that 61 percent of them were over 40 years old (75, p. 21).

The mode of transportation to ports differs by port (100, monthly issues January 1965-August 1970). Buenos Aires received most of its export supplies by rail until 1966. Since then, truck transport has accounted for 50 to 65 percent of grain arrivals. Bahia Blanca receives 55 to 75 percent of its supplies by rail, evidence of the increasing tendency toward rail transport to that port since 1967. The Port of Rosario, until 1967, received up to three-fourths of its supplies by truck. Since 1967, the percentage received by truck has decreased in favor of rail transport, which in 1969 accounted for 53 percent of receipts.

The Parana River, leading to the Port of Rosario, and the River Plata estuary, formed by the junctions of the Parana and Uruguay Rivers, are the focal points of Argentina's navigable network of inland waterways. Only small quantities of grain or livestock are transported by water although increasing this practice could reduce marketing costs of grains from the North and Northeast regions. 27/ Improvements in these waterways could also provide important links with Bolivia, Paraguay, and interior points of Brazil and Uruguay.

River traffic has been low because irregular seasonal changes in water levels cause many of the rivers to become unnavigable. This situation is now being partially relieved through dredging operations along the network.

National Institute for Agricultural Technology

The National Institute for Agricultural Technology (Instituto Nacional de Tecnologia Agropecuaria), or INTA, was created in 1956 as an independent agency of the Federal Secretariat of Agriculture and was charged with conducting the nation's agricultural research and extension work. Its main financial resources come from a 1.5-percent tax on the value of all agricultural exports. The Director General is responsible to a six-member Board of Directors. The president and vice president of the board are appointed by the Secretary of Agriculture, three members represent farm associations, and one represents the eight national universities, the colleges of agriculture, and the schools of veterinary medicine (66).

In 1967, INTA had 40 experiment stations, three substations, and four auxiliary stations throughout the country (67, p. 49). Staffing these were some 3,400 employees, including 925 professionals and 978 subprofessionals. These two categories include extension agents as well as research personnel (67, p. 56). INTA has focused on physical production, giving little attention to the economics of a particular practice. The Institute is now increasing its economics staff and has established a graduate school of economics at its Castelar experiment station.

New varieties of seeds for crops and pastures have been developed and disseminated by INTA. Large-scale livestock experiments with crossbreeding, disease and health control, fertility, rates of gain, and range management have been conducted. Fertilization trials are being conducted. Cost of production and farm management studies have been initiated recently. In addition, INTA is cooperating with the World Bank on a supervised credit program to increase the efficiency of cow-calf operations.

27/ This was reported in a study on the waterways of the Mesopotamia region (70).

National Grain Board

The principal grain marketing institution is the Junta Nacional de Granos, or the National Grain Board (NGB). The NGB is administered by a president and a vice president chosen by the Secretary of Agriculture. The Secretaries of Commerce, Treasury, and Transport each designate one member to the board. For the other board positions, farm organizations designate nominees, and four are selected by the Secretary of Agriculture. One each is to represent producers' associations, farmers' cooperatives, industry, and the grain trade (61).

Although grain production and marketing remain with private firms and cooperatives, the NGB has considerable control over them through its broad regulatory powers and its authority to set terms and conditions for sale of grains.

The NGB administers the price support program for grains and oilseeds, which during 1955-70 was a two-level system. Theoretically, under the first level, which is still in effect, producers are guaranteed a price at which the NGB will purchase all grains delivered to its installations in Buenos Aires. Purchases at its inland storage facilities are at a discounted rate. Only wheat has been sold to the NGB in significant quantities under this program, however. Producers often sell to private elevators at lower prices to obtain ready cash, since the NGB pays in installments over a 90-day period and there are usually added transportation costs involved in selling grains to the NGB.

The other price support program level was a minimum price for legal sale of grains. This price was lower than the guaranteed support price and was based on the estimated cost of production for each individual commodity. However, 1970 was the last year for this minimum support price. In 1971, Argentina returned to the single-level price support program discussed above.

Stocks of commodities acquired by the NGB are used to stabilize the domestic market. The NGB may also release these stocks to exporters for export. In recent years, only wheat has been bought in significant quantities under this program.

The NGB establishes domestic and export commodity grades and standards. Wheat has three regular grades but a fourth can be established depending upon the season. These wheat grades are based on minimum weights and maximum tolerances for content of broken grain, damaged grain, foreign material, and smutty grain. Tolerances for grades differ for common (hard or semi-hard) and durum wheat and may be adjusted for each grade depending upon wheat quality in any season (app. table 12).

The National Grain Board is responsible for grading and issuing certificates of quality for all grains exported. Shipments of wheat originating from ports north of Buenos Aires are referred to as "Up River," and shipments originating from ports south of Buenos Aires are referred to as "Southern." "Up River" is normally lighter in weight and usually trades at a discount to "Southern."

Corn is traded on a one-grade basis, FAQ (Fair Average Quality). To be classed FAQ, corn must meet standards pertaining to moisture content and damaged or broken grains (app. table 13). The tolerances vary by season and by market destination, export or domestic. A similar system of maximum tolerances and minimum moisture limits applies to sales of grain sorghum.

Standards for oats, rye, and barley are based on four production zones. In most years, grains grown in northern areas sell at discounts to grains grown in southern areas.

Terminal storage of grains is almost entirely in the hands of the National Grain Board. All storage facilities at ports, as well as many inland storage facilities, are owned by the NGB. Commercial storage facilities not owned by the NGB are regulated by it through licensing to private owners and through the setting of prices for storage of certain types of grains. This has hampered the building of private storage facilities and was a cause of the shortage of storage space over most of the 1960's. However, since 1968, storage has been adequate for normal harvest years.

Most ports and interior markets have facilities for both bag and bulk storage. Since the mid-1960's, there has been a great effort to ship and store grain in bulk. In 1960, about 70 percent of all grains were shipped and stored in bags. In 1968, the Pampa region shipped and stored about 80 percent in bulk while the Northern Provinces still shipped and stored grains mostly in bags.

In 1964, total grain storage capacity in Argentina was less than 7 million tons. 28/ By 1969, it had increased over 25 percent to 8.9 million tons (app. tables 14 and 15). The National Grain Board owned roughly 48 percent of all storage capacity in 1969, most of which was located at the ports or inland railroad stations. Storage of grain in bags by the NGB decreased from 664,000 tons in 1964 to 411,000 tons in 1969. 29/ Since 1965, on-farm storage has become increasingly more important, stimulated by bonus prices paid for bulk grain and a credit plan for construction of silos offered through the Bank of the Nation. In 1954, bulk farm storage amounted to 100,000 tons, increasing to 2,350,000 tons in 1969.

For many years, the NGB has been plagued by congestion at terminal elevators and storage depots, and in past years has offered price inducements for delayed delivery of grain. Even so, seasonal congestion continues to occur in the major shipping ports. When elevators can take no more grain, railway cars and trucks are used for storage.

To avoid this seasonal congestion, large projects aimed at increasing storage facilities in the countryside were initiated in 1967. The goal was to double inland storage capacity by 1970. With the financial help of the Inter-American Development Bank and a \$10 million loan from the U.S. Agency for International Development in 1968, the Bank of the Nation offered credit for the construction of elevators by cooperatives and local storage operators (58, Jan. 11, 1970). Twenty percent of the total cost of the elevators was financed by the buyer and 80 percent by the Bank of the Nation. Interest on the loans was set at 8.75 percent for 5 years for farm-type silos and up to 12 years for elevators. Inland private storage (bulk) has increased by roughly 1.5 million tons since 1965 (app. table 14).

The NGB has initiated a scheme with the railroads whereby the NGB leases land from the railroads for the building of silos and storage facilities. This will improve inland storage capacity and improve facilities at the main rail lines.

Total operations of the NGB are financed from a specific-purpose export tax of 1.5 percent applied to the Government-established export index value 30/ of the particular commodity in question (table 24).

28/ Total grain storage capacity here excludes any bag storage facilities under private ownership.

29/ Bag storage increased to 705,000 tons in 1965 because of an exceptionally large harvest of the 1964/65 wheat crop.

30/ These export index values are periodically adjusted to reflect changes in world price levels. See earlier section on taxes (p. 46) for more details.

National Meat Board

The National Meat Board (NMB) was established in 1933 as an autonomous entity within the Government. It is directed by a board chairman and nine other officials, four appointed by the Secretary of Agriculture and five by livestock producers (46).

The stated functions of the NMB are to service and regulate the livestock and meat industry, and to ensure an orderly and continuous flow of meat products to domestic and export markets. The NMB licenses the livestock and wholesale meat markets, establishes quality standards and provides grading services, conducts market research, provides livestock and meat market news services, and participates in the formation of Government policies. Exports of livestock and livestock products can be regulated by the NMB when necessary, and it has the authority to regulate trade practices to ensure fair competition and absence of monopoly. It can also enter into supply agreements with foreign buyers.

The NMB has official grading facilities in the central packing plants, the larger regional packing plants, and in most of the smaller abattoirs in the Buenos Aires area. These packing plants account for over half of Argentine beef production. There are three basic export grades of Argentine beef, Chiller, Continental, and Manufacturing. Argentine Chiller beef goes mostly to the United Kingdom. Continental, most of which ranks below U.S. Good, goes to continental Europe. Manufacturing beef, mostly low grade, goes to continental Europe for sausages. Purchases of live cattle from producers are graded by size and degree of fatness. There are no grades for pork, mutton, and lamb carcasses (46).

NMB operations are financed from a levy of 2.35 percent on the sale of cattle, sheep, and hogs for slaughter. Of the total levy collected, 25 percent is for administrative expenses of the board, 15 percent is for social benefits for the packinghouse workers, and 60 percent is held by the NMB in an account for the Argentina Meat Producers Association for its operation (58).

Inspection of all slaughtering facilities and slaughter animals for export is in the hands of the Secretary of Agriculture. While many of the slaughtering facilities for export are old, the sanitation inspection is recognized by the U.S. Department of Agriculture as meeting all U.S. standards (46, p. 9).

Terminal markets accounted for 34 percent of all slaughter cattle sales in 1969, with Liniers alone handling about 30 percent (table 27). An increasing share, about 37 percent in 1969, was through local auctions scattered throughout Argentina. The percentage of cattle marketed directly to the packer declined over most of the 1960's, despite the fact that cattle arrive in better condition when marketed in this manner. However, in 1968 and 1969, direct sales to packers increased while unregistered cattle sales decreased (62, pp. 45-47). The number of unregistered cattle sales accounted for almost 16 percent of all livestock sales in 1969. Use of the direct producer-to-packer channel depends solely upon export opportunities. If prices are high and buyers are plentiful, exporters prefer direct shipment. When the export situation is poor, most cattle are bought in the terminal markets.

Table 27.--Argentine cattle marketings in registered and unregistered markets as percent of total sales, averages 1936-40, 1946-50, 1961-65, and annual 1966-69

Year	Registered			Unregistered	Total
	Terminal markets	Country markets	Direct sales	markets	sales
	Percent				
1936-40	36.6	20.4	28.5	14.5	100.0
1946-50	42.9	23.3	17.7	16.1	100.0
1961-65	37.1	32.1	10.6	20.2	100.0
1966. . .	40.7	34.5	8.0	16.8	100.0
1967. . .	36.5	36.3	8.3	18.9	100.0
1968. . .	34.6	37.3	11.8	16.3	100.0
1969. . .	34.2	37.0	13.1	15.7	100.0

Source: (37).

Argentina Meat Producers Association

The Government promotes direct producer participation in meat processing and livestock marketing through the Argentina Meat Producers Association (Corporacion Argentina de Productores de Carnes, or CAP). The CAP was established in 1934 to compete with the large foreign packinghouses dominating the Argentine meat processing industry. Although it is in theory an industrial and commercial entity, owned by livestock producers and completely independent of NMB operations, the CAP is supported by the Government levy on sales of livestock for slaughter.

The CAP is the largest meat packing agency in Argentina. It operates several packinghouses and retail outlets. It exerts considerable competitive influence through its purchases of livestock and its marketing of livestock products (42).

The CAP is administered through a board of directors consisting of 16 members representing different livestock-producing regions of the country. The board members are chosen by 90 electors, selected by the livestock producers.

Agricultural Cooperatives

In 1967, Argentina had 1,360 local agricultural cooperatives (table 28). Their total membership was 458,000 and the total value of their operations was 167 million pesos. 31/ Local agricultural cooperatives serve mainly as a marketing channel for the producer. They marketed slightly over one-fifth of the total value of agricultural production in Argentina in 1967. For some commodities, such as grain, almost half the total value of production was marketed through cooperatives. Other functions provided by cooperatives include providing credit, mechanization, insurance facilities, and educational opportunities; selling inputs; and processing agricultural products.

31/ Value of operations is for the most part sales of specific agricultural commodities, although the figure does include sales of some inputs to local cooperative members.

Table 28.--Numbers, membership, and value of operations of major types of agricultural cooperatives and their share of total Argentine agricultural production, 1967

Type of cooperative	Cooperatives						Value of cooperatives' operations as a percent of total agricultural production	
	Number	Percent of total	Number of members	Percent of total	Value of operations 1/	Percent of total production 2/		
			Thou.		Mil. pesos		Mil. pesos	
Grain marketing . . .	575	42	303.9	67	107.8	65	216.1	50
Livestock.	69	5	41.7	9	15.3	9	386.6	4
Other agricultural . . .	716	53	112.2	24	43.9	26	175.8	25
All agricultural cooperatives . . .	1,360	100	457.9	100	167.1	100	778.5	21
All cooperatives . . .	3,654	--	3,450.0	--	316.9	--	--	--
Agricultural cooperatives as percent of all cooperatives. . .		37		13	Percent		--	--

1/ Value of commodities sold by respective cooperatives plus a small amount representing sales of inputs to local cooperative members.

2/ Total value of commodity production whether marketed or not by the respective cooperatives (8).

Source: (71).

In recent years, local agricultural cooperatives have become major sources of credit. Most loanable funds from cooperatives consist of their savings and capital, short-term loans from banks, or loans granted to the local cooperatives by the cooperative federation. In addition to giving credit, cooperatives may advance partial payment for commodities delivered to the cooperative before they are actually sold to a buyer. In addition, producers may obtain credit by pooling their needs and having the cooperative negotiate collectively for bank credit. In some areas, about 50 percent of all agricultural loans are made in this manner. Most of these loans go through the Bank of the Nation (80 percent in 1965), but in recent years cooperatives have borrowed from the Agricultural Cooperative Bank at slightly higher interest rates, helping to capitalize their own credit system (24, p. 343).

Grain marketing cooperatives are the most important of all agricultural cooperatives. In 1967, they accounted for 42 percent of total agricultural cooperatives, 67 percent of total agricultural cooperative membership, and 65 percent of total volume of operations.

Local agricultural cooperatives over time have formed cooperative federations that are organized around the marketing of specific products or groups of products. In 1967, there were 10 federations in Argentina, accounting for almost half the sales volume of all agricultural cooperatives. The keystone of the cooperative movement in Argentina is a federation of federations, the Agrarian Inter-Cooperative Council (CONINAGRO). Its main function is to establish organizational ties between the federations and their local members, to maintain active contact with Government agencies, and to exert strong political and economic influence.

VI. SUPPLY RESPONSE TO PRICE CHANGES

Changes in Government policies and fluctuating weather conditions appear to be as important as prices in determining Argentine farmers' production decisions. These two forces produce risks at the farm level which producers attempt to compensate for in ways that seem to be counter to what price movements would indicate.

Most of the farms in the Pampa region raise both cattle and grains. Temperature and rainfall patterns create a definite seasonal growth pattern for pastures. Cattle raising based on pastures only, either unimproved or improved, puts a relatively low ceiling on the number of cattle that can be produced on a unit of land. During normal weather, producers can grow grains in addition to pasture. The small grains are pastured during the season of slow pasture growth and produce as much forage as pastures do. They mature during the period of rapid pasture growth and can be harvested as grain without reducing the ranch's carrying capacity. Small grains are pastured in late fall, winter, and early spring. In some areas, spring-planted corn or sorghum is also grown without reducing the ranch's carrying capacity. Given a drought in spring, fall, or winter, the grains--including corn and sorghum--can be pastured. In the event of abundant rainfall, more of the grain is harvested because less is needed for pasture. Thus, the combination of grains and livestock is complementary, at least within traditional price relationships. The grains provide an insurance for the livestock enterprise in the event of bad growing conditions, and they also provide a cash crop and an alternative to livestock if price ratios change.

In making year-to-year decisions about the mix of crops and pastures, the producer may be more influenced by the age and number of cattle on hand and current weather conditions than by current prices. When price ratios change and appear to be relative

permanent, the producer can be expected to weigh the price factor more heavily. But the cattle cycle, coupled with abnormal weather or changes in Government policy, may completely wipe out any apparent price response.

Commodity Price Trends

Farm prices in Argentina result from interaction of Government farm price supports, domestic prices in general and outside the area of support, and export prices. Argentina does not export enough of any commodity to significantly influence world prices with the possible exception of beef.

Support prices were announced each year for all grains except sorghum during the last two decades (app. table 16). Sorghum support prices have been in effect since 1957/58. However, Government purchases to support prices were used largely for wheat, since domestic market prices for the other grains have been above support levels. Therefore, support prices probably are not significant in producer plans except perhaps for wheat. During the 1960's, domestic prices fluctuated widely (app. table 17). Generally, wheat and corn prices were higher than rye, oats, or barley prices. Among the six grains, sorghum prices were the lowest in the early 1960's but in the late 1960's equaled or exceeded rye, oats, and barley prices.

Export prices, measured by export unit values (f.o.b. Buenos Aires), reflect all grades and types of a given commodity. They are not quite comparable to the series given for support or for domestic prices. However, they can serve effectively as a proxy for world market prices. Export prices also fluctuate widely but generally remain higher than domestic prices (app. table 18 and figs. 5-7).

Liveweight and retail beef prices decreased in the early 1960's, reached a peak in the mid-1960's, declined after that, and then reached another peak in 1970 and 1971. The general overall trend for 1950-70 was one of rising beef prices. Wholesale and retail prices increased faster than farm prices, indicating that the producer is getting less of the consumer peso (fig. 8).

Wheat Price Patterns and Response

During 1961/62 through 1969/70, National Grain Board support purchases accounted for 3 to 62 percent of wheat production, averaging 22 percent for 1965/66-1969/70 (61, p. 23). Support prices were generally lower than domestic or export prices throughout the 1960's (table 29), the exceptions being 1964 and 1965. During 1963/64 and 1964/65, the National Grain Board purchased more wheat than during the rest of the 1960's combined.

Support prices in general have tended to move with world prices as measured by export unit values, but they have been less variable. Support prices are usually announced prior to planting time to influence the area planted, but occasionally they are changed during the season to influence the area harvested.

Supplies available to the domestic market are the major determinants of domestic prices. Apparent domestic consumption of wheat generally increased over the 1960's, ranging from 3.5 to 4.3 million tons (app. table 7). On a per capita basis, the range is from 163 to 185 kilograms. The trend in per capita consumption fluctuated but showed no up or down trend over the decade. Domestic prices tend to move with the export price and are pulled closer to or further from the support level as world prices fluctuate (fig. 5).

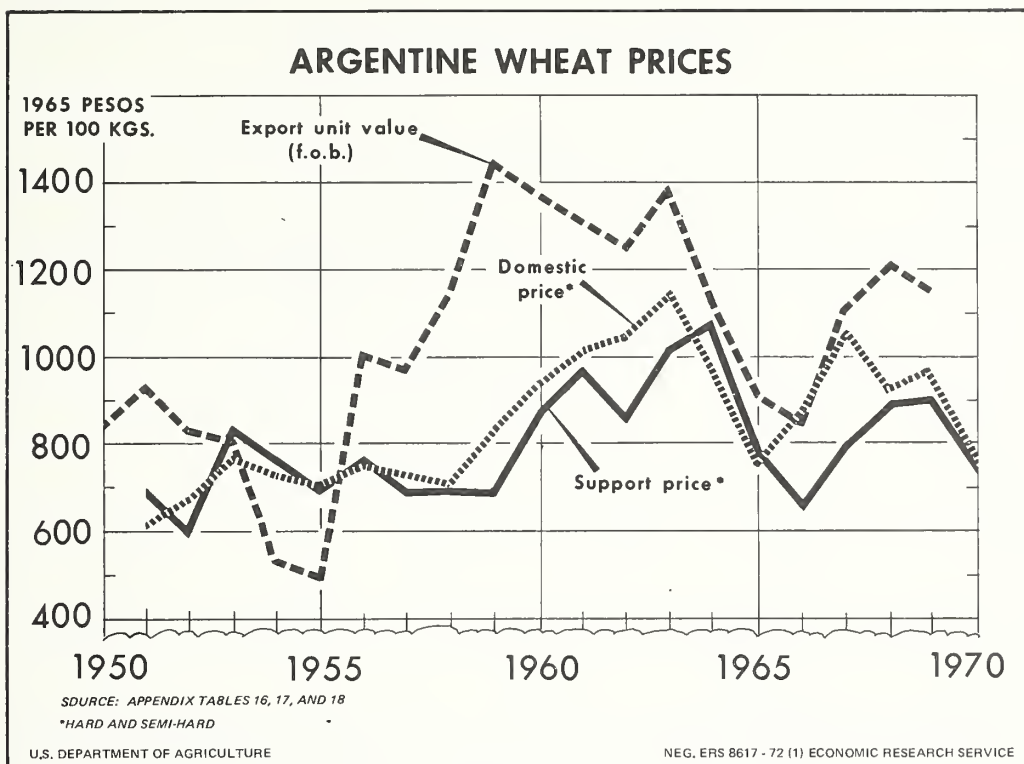


Figure 5

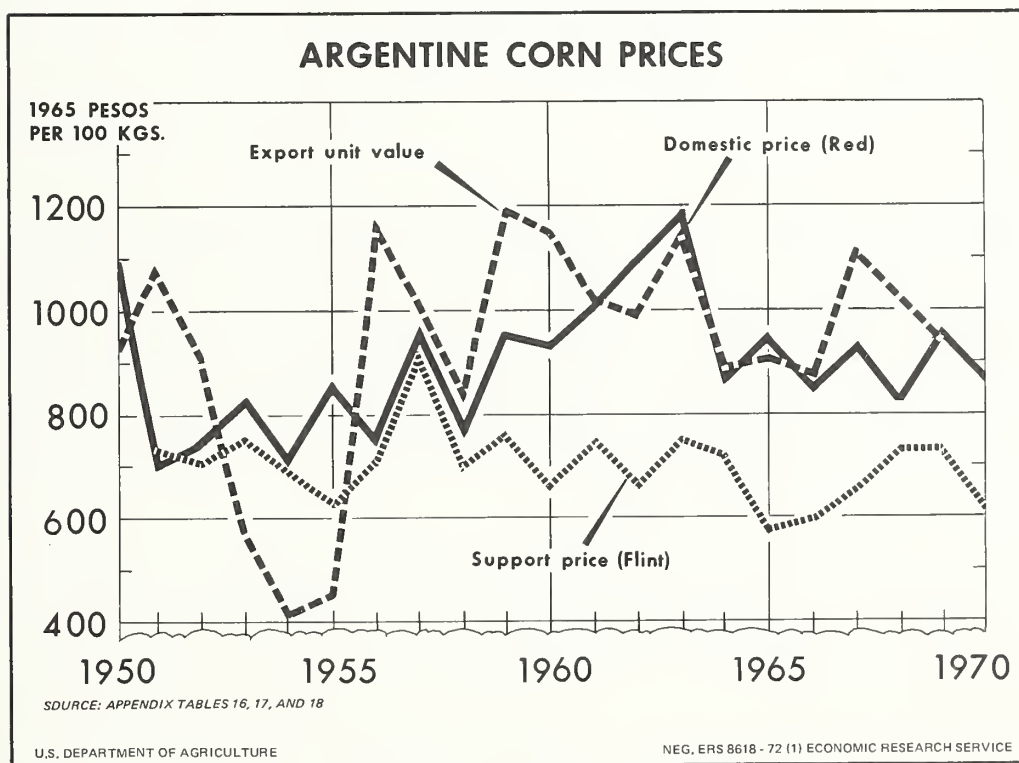


Figure 6

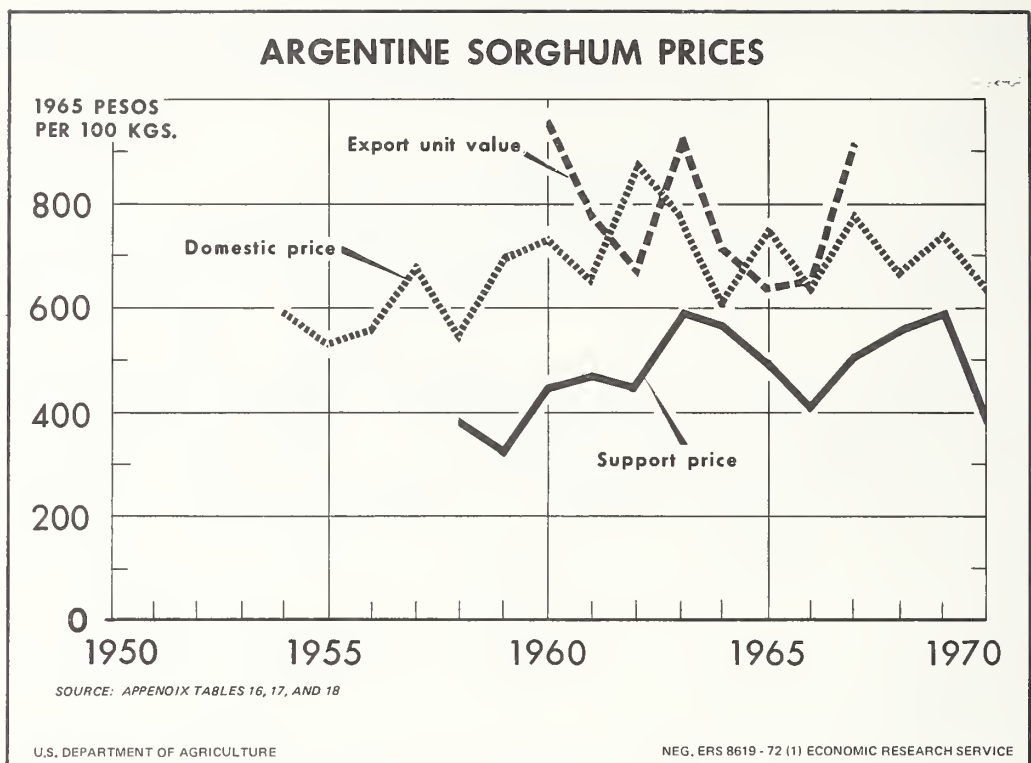


Figure 7

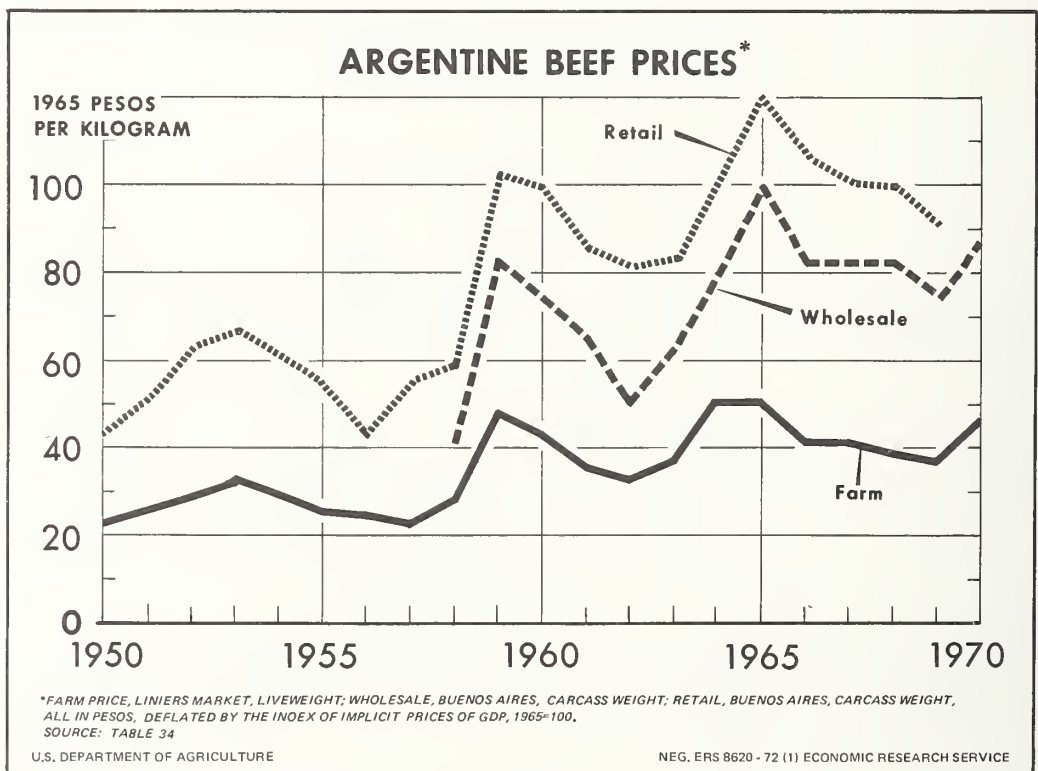


Figure 8

Table 29.--Selected wheat prices, Argentina and c.i.f. United Kingdom, 1960/61-1969/70 1/

Crop year	Argentine prices per metric ton			C.i.f. U.K. prices per metric ton		
	Support	Domestic	Export	Argentina	Australia	Canadian
	price	price	price	63- $\frac{1}{2}$ lbs.	f.a.q.	No. 2 Manitoba
	<u>2/</u>	<u>2/</u>	<u>3/</u>	up river		Northern
	-----1965 dollars-----			-----Current dollars-----		
1960/61	57.50	60.40	78.00	69.60	67.70	74.30
1961/62	51.30	62.00	74.40	72.30	70.70	78.00
1962/63	60.70	68.20	82.70	68.80	69.00	76.80
1963/64	63.90	58.20	67.50	75.40	74.70	80.50
1964/65	46.40	44.90	53.90	70.50	69.90	80.40
1965/66	39.50	52.00	50.30	70.40	72.40	81.90
1966/67	47.00	63.00	66.40	73.70	74.80	84.80
1967/68	52.90	55.40	71.70	71.30	69.50	79.60
1968/69	53.80	57.60	68.40	70.10	68.50	78.10
1969/70	44.20	44.80	n.a.	70.20	66.50	76.50

1/ Argentine prices are not strictly comparable to c.i.f. prices. The first are computed from peso prices deflated by the 1965 GNP price deflator and converted into dollars at an average 1965 exchange rate of 168 pesos per dollar. The second are computed using current exchange rates which varied from year to year. The grades and types of wheat are not fully comparable among the various series. 2/ Hard and semihard wheat on wagon in Port of Buenos Aires. Applies to second year of crop year. 3/ Export unit values representing an average price for all grades and types of wheat exported. Applies to second year of crop year.

Sources: Argentine prices: computed from app. tables 16, 17; c.i.f. U.K. prices taken from various issues of (35).

A series of linear regressions using area planted, area harvested, or production as the dependent variable for the period 1951/52-1966/67 indicates that prices affect the amount of land devoted to wheat and the level of wheat production; that corn competes with wheat in some areas; and that weather influences the amount of wheat area that is finally harvested (31, pp. 16-17). However, even the "best equations" had relatively low R²s. Wheat production price elasticities were higher than wheat area price elasticities. Wheat production price elasticities from the two better equations were 0.9 to 0.7 on a 1-year lagged domestic price deflated by the cost of living index. For wheat area seeded, the price elasticity for the better equation was 0.2; that for area harvested was -0.1. Good weather was more significant than price as a determinant of area harvested.

An analysis of production response of wheat and corn to changes in their price for 1925-45 and 1946-65 in the Provinces of Buenos Aires, Santa Fe, Cordoba, and Entre Rios was not conclusive. Price elasticities of area planted were significantly different from zero only in Santa Fe and Cordoba in the case of wheat. Wheat price elasticities ranged from 0.3 to 0.5, with a cross-price response for corn of -.3 (45, pp. 40-48). 32/

32/ 1946-65 prices were not lagged, on the hypothesis that price supports affected farm decisions.

Rojko, Urban, and Naive (59, pp. 80-84) used a direct price elasticity for wheat production of 0.3 and a -0.13 cross-price elasticity for coarse grains production in an econometric world grain model that included wheat, coarse grains, and rice. These appeared to give more consistent results in their interaction throughout the model.

In a recent study to determine impacts of prices, weather, and yields on area planted, INTA divided the major wheat areas of Argentina into five regions with two subzones in two of the regions and ran many different regression equations using 1945/46-1965/66 data. Shortrun price elasticities for area planted ranged from 0.1 to 1.1. Longrun price elasticities ranged from 0.2 to 1.8. Countrywide shortrun and longrun price elasticities were 0.5 and 1.1, respectively (table 30). Current support prices tended to give better results than lagged market prices. However, in general, the equations did not give conclusive results.

Table 30.--Shortrun and longrun price elasticities for Argentine area planted in wheat, computed by INTA

Region	: Percent of : : country : : production :	: Shortrun : : elasticity :	: Longrun : : elasticity :
I - N. Santa Fe <u>1/</u>	4	1.16	1.78
IIN - S. Santa Fe, S.E. Cordoba <u>2/</u>	18	.13	.32
IIS - N. Buenos Aires	16	<u>3/</u>	<u>3/</u>
III - Entre Rios <u>1/</u>	4	.33	.55
IV - S.E. Buenos Aires <u>1/</u>	15	.17	.20
VN - Cordoba <u>1/</u>	3	.55	1.77
VS - La Pampa, W. Buenos Aires	33	.32	.41
Country.	100	*.48	1.09

* Significant at 10-percent confidence level.

1/ Used support price (t). 2/ Used market prices (t-1). 3/ Had wrong signs.

Source: (33, table 4.21).

Corn Price Patterns and Response

Corn prices received by farmers appear to be influenced largely by world market prices. Support prices had little influence during the 1960's because they were considerably below domestic prices (table 31) and insignificant amounts of corn were purchased through support operations (61, p. 23). Domestic prices were below export prices except in 1962, 1963, 1965, and 1969 (fig. 6).

Apparent domestic consumption of corn generally increased over the decade, ranging from 1.7 to 3.8 million tons. Per capita consumption ranged from 80 to 167 kilograms with a generally increasing trend. Exports over the decade accounted for 38 to 64 percent of total production, and carryover stocks were negligible (app. table 7).

Analysis of corn's supply-price response gives as inconclusive results as the analysis of supply responses to wheat.

Table 31.--Selected corn prices, Argentina and c.i.f. North Sea ports, 1960/61-1969/70 1/

Crop year	Argentine prices per metric ton			C.i.f. North Sea port prices per metric ton	
	Support	Domestic	Export	Argentina	U.S. Yellow
	prices <u>2/</u>	prices <u>3/</u>	prices <u>4/</u>		Nos. 2 and 3
	-----1965 dollars-----			----Current dollars----	
1960/61	44.46	59.58	60.65	58.50	53.80
1961/62	39.58	65.36	58.63	61.00	55.30
1962/63	44.52	70.71	67.68	60.90	56.30
1963/64	43.15	51.49	52.56	66.70	60.60
1964/65	34.52	56.13	53.99	67.00	62.20
1965/66	35.65	50.77	51.85	71.60	61.60
1966/67	38.81	55.60	65.65	66.50	63.90
1967/68	43.75	49.29	60.36	61.50	56.00
1968/69	43.81	57.08	56.01	57.50	54.10
1969/70	36.00	51.60	n.a.	66.20	61.20

1/ Argentine prices are not strictly comparable to c.i.f. prices. The first are computed from peso prices deflated by the 1965 GNP price deflator and converted into dollars at an average 1965 exchange rate of 168 pesos per dollar. The second are computed using current exchange rates which vary year to year. Also, grades and types of the various price series are not fully comparable. 2/ Yellow and red bagged on wagon in Port of Buenos Aires. 3/ Red (flint and dent) bagged on wagon in Port of Buenos Aires; applies to second year of crop year. 4/ Export unit values representing an average price for all grades and types of corn exported. Applies to second year of crop year.

Sources: Argentine prices computed from app. tables 16, 17, and 18. C.i.f. prices, 1964/65-1968/69, taken from various issues of (35). Earlier years taken from (25).

Rojko, Urban, and Naive used a production price elasticity for coarse grains of 0.3 with a cross-price production elasticity of -0.18 for wheat in their world grain model (59, p. 105). Maffucci found direct price elasticities for corn area planted to range from 0.3 to 0.6 with cross-price elasticities of -0.3 to -1.4 for wheat area planted in the three major corn-producing Provinces (45, pp. 40-43).

INTA, in its study, divided the country into four major corn production regions with two subzones in one of the regions. Its linear regressions produced shortrun price elasticities of 0.1 to 1.3 and longrun elasticities of 0.4 to 3.2 (table 32).

Shortrun and longrun elasticities for the total country were 0.1 and 0.3, respectively. The period of analysis was 1946/47-1965/66. The better equations were for the regions around the northern tip of Buenos Aires and for Santa Fe (I-A and IV), which together accounted for over half of the country's corn production (table 32).

Table 32.--Shortrun and longrun price elasticities of area planted to corn in Argentina, computed by INTA

Region	:	Approximate percent of total production	:	Shortrun elasticities	:	Longrun elasticities
I-A North tip Buenos Aires, S. Santa Fe, S.E. Cordoba <u>1/</u> . . .	:	46	:	0.13	:	*0.37
I-B Central Cordoba <u>2/</u> . . .	:	18	:	**1.25	:	**1.87
II Entre Rios <u>1/</u>	:	6	:	** .61	:	**3.21
III North half Buenos Aires <u>2/</u>	:	13	:	.62	:	1.60
IV Santa Fe <u>2/</u>	:	11	:	.21	:	** .47
Total country <u>1/</u>	:	100	:	.15	:	** .31

* Significant at 10-percent confidence level.

** Significant at 5-percent confidence level.

1/ Market price (t-1). 2/ Support price (t).

Source: (33, table 4.21).

Sorghum Price Patterns and Response

Support prices for sorghum have been announced only since 1957/58 and very little (less than 2 percent) has been purchased through the support operations of the NGB. Support prices were lower than domestic prices throughout the 1960's (fig. 7 and table 33). Area harvested and production have both fluctuated, but have generally increased rapidly. Years with lower production and area harvested are directly related to lower yields, indicating weather influence.

Sorghum offers an alternative to corn. It requires about the same production practices but is able to withstand more dry weather. Average gross returns per hectare have been higher than wheat's but lower than corn's.

The INTA study found the best price variables to explain changes in sorghum area planted to be the lagged domestic price of sorghum divided by the lagged domestic price of wheat.

Table 33.--Argentine and world sorghum prices, 1960/61-1969/70 1/

Crop year	Argentina price			World price		
	Support	Domestic	Export	Export	Argentina	U.S. Milo
	<u>2/</u>	<u>3/</u>	<u>4/</u>	<u>4/</u> <u>5/</u>	c.i.f. <u>6/</u>	#2 c.i.f. <u>7/</u>
	1965 dollars per metric ton					
1960/61	27.60	38.90	56.90	40.42	n.a.	48.20
1961/62	26.60	51.80	46.30	36.60	n.a.	50.60
1962/63	35.10	46.30	40.40	32.90	n.a.	50.40
1963/64	33.50	35.90	53.70	40.90	54.10	54.90
1964/65	29.20	44.60	41.90	40.20	54.80	54.50
1965/66	24.40	37.90	37.90	40.50	53.20	54.20
1966/67	29.80	45.70	38.40	38.80	55.10	56.42
1967/68	33.20	39.60	54.70	44.20	55.42	56.20
1968/69	34.80	43.90	n.a.	46.00	50.20	50.50
1969/70	28.60	38.00	n.a.	n.a.	54.80	56.90

1/ Argentine prices are not strictly comparable to c.i.f. prices. The first are computed from peso prices deflated by the 1965 GNP price deflator and converted into dollars at an average 1965 exchange rate of 168 pesos per dollar. The second are computed using current exchange rates which varied year to year. Also, grades and types of sorghum in the various price series are not fully comparable. 2/ Bulk in Buenos Aires. 3/ Bagged on wagon in Port of Buenos Aires. Data for second year of crop year. 4/ Export unit value, weighted average of all types and grades (f.o.b.). Data for second year of crop year for domestic price. 5/ Same series as under domestic price but taken from (27). 6/ C.i.f. Rotterdam. 7/ C.i.f. North Sea ports or Rotterdam.

Sources: Domestic prices taken from app. tables 16, 17, and 18. World prices for 1960/61-1966/67, (25); for Argentina and the United States for 1965/66-1969/70, (35).

Beef Price Patterns and Response

Beef Price Trends at Different Marketing Levels

Beef price trends in Argentina exhibit wide fluctuations at the farm, wholesale, and retail levels. Farm prices have been the most stable. The spread between the farm and retail price seems to be widening, while that between farm and wholesale prices is narrowing (fig. 8 and table 34).

Nevertheless, price fluctuations at the three marketing levels move very closely together. Hence, domestic beef prices and responses in this section are discussed in terms of farm prices as reflected in the Liniers Central Market in Buenos Aires.

Major Price-Determining Factors

Argentine beef price series show markedly all three classical variations--long-term trend, cyclical fluctuations, and seasonal fluctuations. Because of Argentina's high rate of inflation, different price deflators suggest different price trends. Kohout (43) deflated the cattle prices in Liniers Central Market by the wholesale price index and obtained a trend that decreased slightly between 1935 and 1958 and then generally increased until his data cut-off date of 1967 (fig. 9). The INTA study (33)

Table 34.--Meat prices in Argentina, 1950-70 1/

Year	Beef				Pork				Mutton and lamb			
	Retail 2/		Wholesale 3/		Liners Central Market 4/		Liners Central Market 4/		Avellaneda Market 5/			
	Current	Deflated	Current	Deflated	Current	Deflated	Current	Deflated	Current	Deflated	Current	Deflated
	-Pesos per kilogram-											
1950.	1.40	43.21	n.a.	n.a.	0.72	22.22	44.0	1.57	48.46	81	29.32	904.94
1951.	2.15	50.71	n.a.	n.a.	1.15	26.02	51.5	2.36	53.39	89	50.26	1,137.10
1952.	3.56	62.68	n.a.	n.a.	1.62	28.52	56.5	2.84	50.50	83	55.95	985.04
1953.	4.00	66.44	n.a.	n.a.	1.94	32.23	63.8	3.09	51.33	85	68.08	1,130.90
1954.	4.00	61.07	n.a.	n.a.	1.93	29.47	58.3	3.49	53.28	89	68.21	1,041.37
1955.	4.00	55.48	n.a.	n.a.	1.87	25.94	51.3	3.56	49.38	82	74.95	1,039.53
1956.	4.00	43.67	n.a.	n.a.	2.28	24.89	49.3	4.27	46.62	78	112.09	1,223.69
1957.	6.00	55.05	n.a.	n.a.	2.52	23.12	45.8	5.63	51.65	86	127.33	1,168.17
1958.	8.50	58.95	4.00	41.61	4.04	28.02	55.5	7.99	55.41	92	144.45	1,001.73
1959.	29.80	102.37	24.00	82.45	14.06	48.30	95.6	16.40	56.34	94	378.77	1,301.17
1960.	34.38	98.71	26.00	74.65	15.15	43.50	86.1	16.23	46.60	78	414.61	1,190.38
1961.	33.32	85.85	25.50	65.70	13.78	35.51	70.3	19.72	50.81	85	362.10	933.01
1962.	40.37	81.80	29.00	50.76	16.08	32.58	64.5	31.82	64.48	107	455.11	922.21
1963.	52.47	83.55	39.50	62.90	23.25	37.02	73.3	42.95	68.39	114	916.38	1,459.20
1964.	83.00	103.70	62.50	78.09	40.51	50.61	100.2	51.92	64.87	108	1,314.86	1,642.75
1965.	120.00	120.00	97.10	97.10	50.52	50.52	100.0	60.06	60.06	100	1,311.27	1,311.27
1966.	129.36	106.09	100.00	82.01	49.94	40.96	81.1	55.07	45.17	75	1,238.00	1,015.34
1967.	151.04	100.94	123.00	82.20	60.71	40.57	80.3	82.95	62.12	103	1,189.00	794.57
1968.	165.01	98.95	137.20	82.15	64.24	38.52	76.2	123.90	74.30	124	1,260.00	755.58
1969.	164.00	91.21	134.70	74.52	66.84	37.15	73.5	135.84	75.50	126	1,810.00	1,006.00
1970.	n.a.	n.a.	192.00	87.69	101.00	46.13	91.1	124.97	57.07	95	1,918.60	876.23

1/ Deflated series in 1965 pesos; indexes, 1965=100. 2/ Buenos Aires, pesos per kilogram of carcass weight. 3/ Buenos Aires, pesos per kilogram of carcass weight. 4/ Buenos Aires, pesos per kilogram live weight. 5/ Buenos Aires, pesos per head (live weight). The average weight of animal slaughtered, given by the National Meat Board, was 19 kilograms in 1950-53, 1955, 1957, and 1958; 18 kilograms in 1954, 1960, 1961, 1963-66, and 1968-70; 17 kilograms in 1956, 1962, and 1967; and 16 kilograms in 1958.

Sources: (37) - 1963, 1967, and 1969; (28); and (58, Apr. 1971).

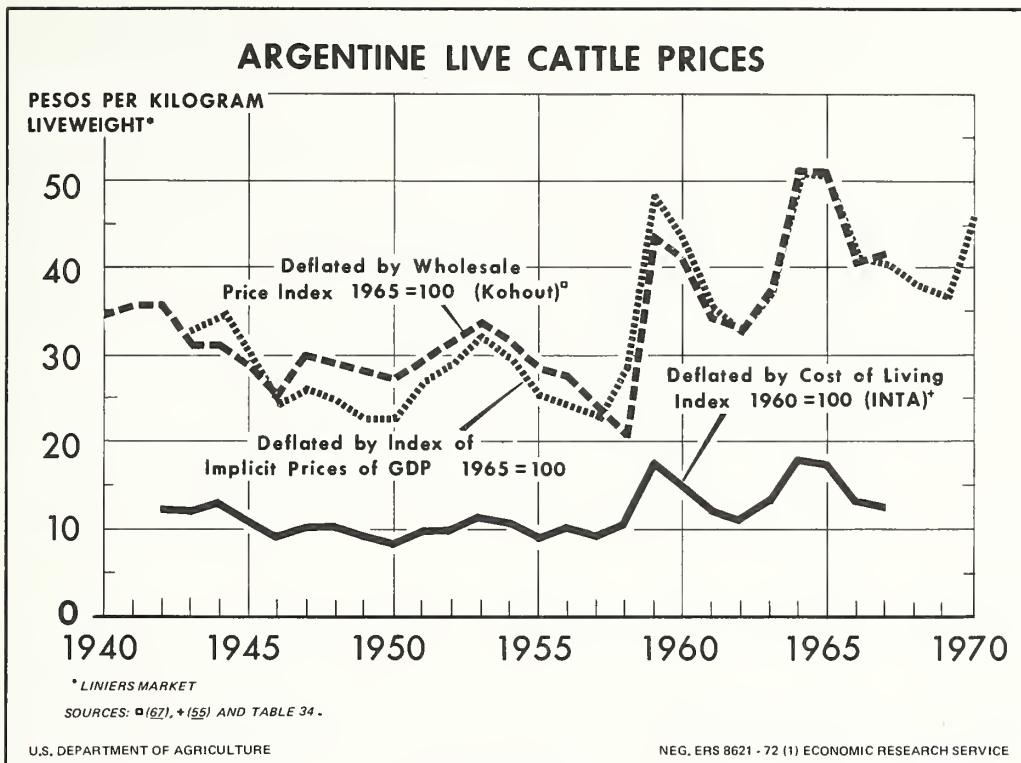


Figure 9

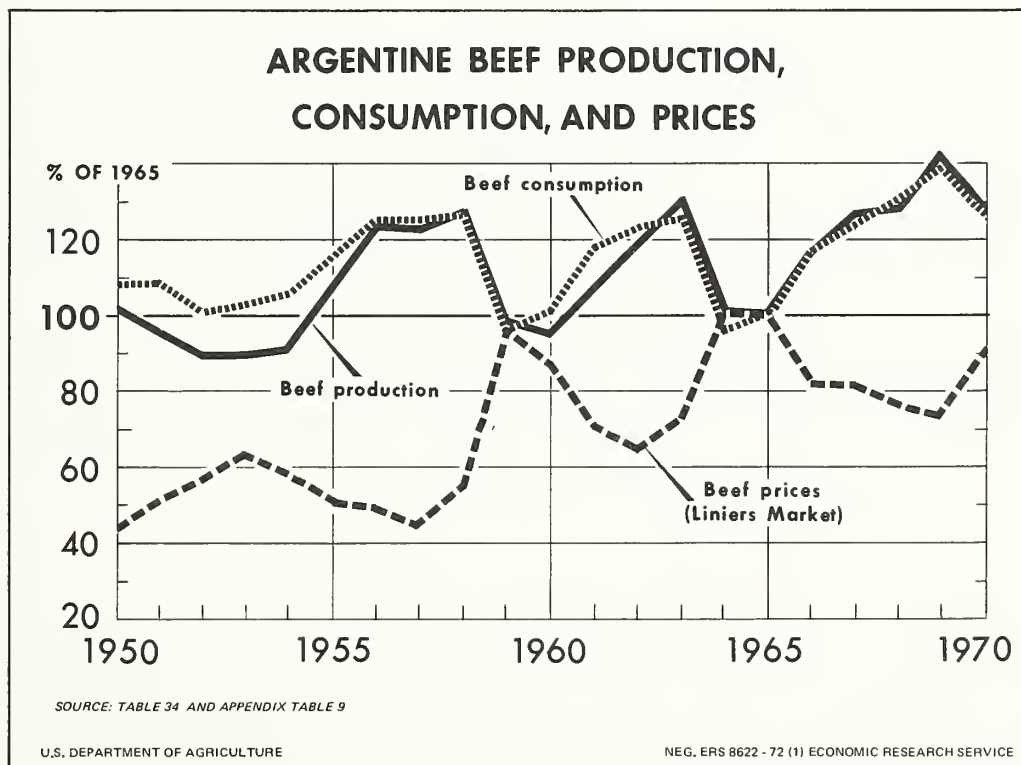


Figure 10

deflated the same prices for 1942-47 by the cost-of-living index. This resulted in price that fluctuated cyclically about the one mean between 1942 and 1958 and then about a higher mean between 1959 and 1967, without any marked upward or downward trend in the two periods. The same result was obtained by the authors of the present study deflating the same series by the index of implicit prices of GDP. In terms of 1965 pesos, beef prices fluctuated about the mean of 27 pesos per kilogram between 1945 and 1958 and about the mean of 42 pesos between 1959 and 1970, without a marked upward and downward trend during the periods. These results seem to suggest that since 1945, Argentine beef prices have behaved as a step function, demonstrating price stickiness at the top. In 1958, the exchange controls and maximum price ceiling imposed on Liniers Market were eliminated. This resulted in a jump in beef prices of almost 10 pesos per kilogram--over 50 percent higher than the previous level. A further increase in beef prices in 1971 of close to 100 percent above 1970 prices may well mean a new level of prices.

Cyclical fluctuations in Argentine beef prices have varied in duration and intensity. Since 1950, they have been particularly well pronounced, lasting from 5 to 7 years. The successive cyclical price troughs occurred in 1950, 1957, 1962, and 1969. In three of these years--1950, 1962, and 1969--the fall in prices was induced by droughts which forced a high level of liquidation followed by a period of herd build-up, lower level of slaughter, and a consequent increase in beef prices (fig. 8).

Cattle slaughter and beef production move almost inversely to price changes (fig. 10). The cyclical nature of the slaughter-price relationship can be attributed to the particular nature of the industry--that is, cattle are both a capital good and a finished product. When cattle prices rise, producers attempt to increase production by building up the cow herd, and this curtails the immediate supply of cattle for slaughter. At the same time, they may withhold steers from the market to increase their weight in expectation of further price increases. On the other hand, when prices fall, they reduce herds by selling cattle for slaughter in expectation of further declines in prices, and thus push prices down even more (7, p. 10).

Production of pigs and sheep has similar characteristics, except that their cycles have different duration. Also, in the case of sheep, slaughter depends not only on the price of meat but also on the price of wool--which makes the slaughter-price relationship more complicated (figs. 11 and 12).

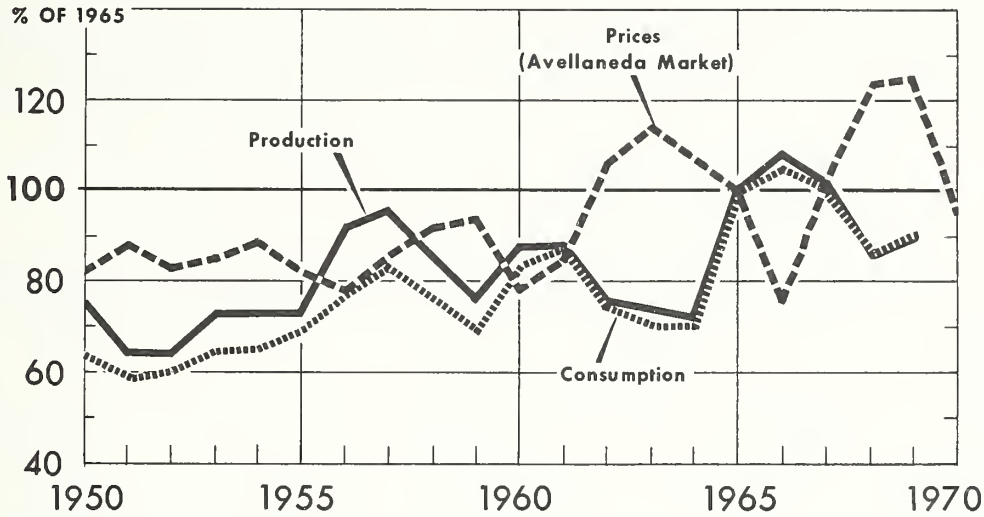
Livestock production cycles are attributed to price variations and to biological influences. However, the cycle's intensity and duration are affected by climate, pasture conditions, the general economic situation, competition from crops, and Government intervention through price regulations and exchange controls. It is difficult to isolate the effects of a single factor.

Seasonal cattle price and slaughter levels are also inversely related, though not for all categories. Prices are lowest in May and highest in October, while the pattern for total slaughter is the reverse. This is not true for steers and yearlings, however, whose prices tend to increase toward the end of the year, when more exports take place. Prices of cows and calves tend to fluctuate within a wider range than those for steers and yearlings (7, p. 8; 43, p. 70; 50, p. 79).

Supply Responses to Price Changes

Studies of beef supply response to price reflecting the above patterns indicate a negative initial response, followed in later periods by the expected positive response. A multiperiod analysis by Kohout of the slaughter response to price changes indicated a negative elasticity in the first period which became positive in the next, reached its maximum value of 0.98 in the third period, and then rapidly diminished. After the fourth period, the response was insignificant (43, p. 158).

ARGENTINE PORK PRODUCTION, CONSUMPTION, AND PRICES



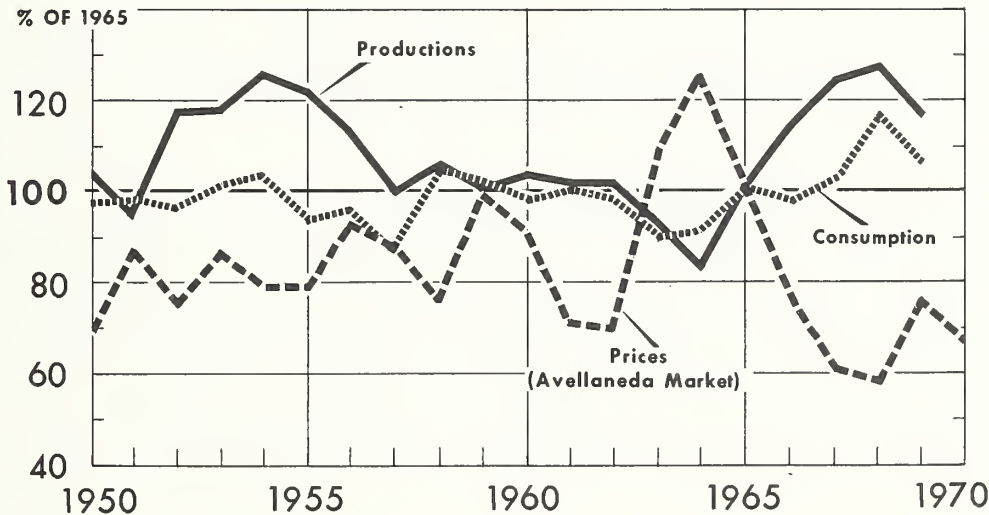
SOURCE: TABLE 34 AND APPENDIX TABLE 9

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Figure 11

ARGENTINE MUTTON AND LAMB PRODUCTION, CONSUMPTION, AND PRICES



SOURCE: TABLE 34 AND APPENDIX TABLE 9

U.S. DEPARTMENT OF AGRICULTURE

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Figure 12

INTA (33), using the average of lagged prices of 2, 3, and 4 years, obtained a beef supply elasticity of 0.23. Although this response is weak, it supports Kohout's conclusion that a positive reaction to price changes occurs if sufficient time lag is allowed.

Otrera (54) calculated the shortrun price elasticity of -2.48 and Nores (50) of -0.003, further confirming the negative supply response to price changes in the short-run. These two authors, as well as Rea (57), also calculated longrun elasticities, but their results seem inconsistent with the observed behavior of the beef industry (table 35).

Table 35.--Beef supply price elasticities in Argentina

Source	Period of analysis	Elasticities	
		Shortrun	Longrun
INTA 1/	1956-65	--	0.230
Rea 2/period A	1923-47	--	-.360
period B	1948-65	--	-.210
Otrera 3/	1945-64	-2.480	-2.660
Nores 4/	1935-66	-.003	-.314
Kohout 5/period I	1935-67	-.610	--
" II	"	--	.690
" III	"	--	.980
" IV	"	--	.680
" V	"	--	.050

-- means not computed.

1/ (33) Price average t-2, t-3, and t-4.

2/ (57)

3/ (54)

4/ (50)

5/ (43) Elasticities for normal prices, periods I, II, III, IV, and V, refer to supply response to price change in year t to year t-5.

Exports and International Beef Prices

Almost a third of Argentine beef production is exported. In world beef trade, Argentina's share is 25 percent. Hence, Argentina's domestic beef prices are closely related to international beef prices (table 36 and fig. 13). 33/ During 8 of the 13 years 1955 to 1968 (a period for which complete data are available), domestic and international prices moved in the same direction. This may indicate that the beef supply situation in Argentina has an impact on world prices for beef and, in turn, that Argentine domestic prices and consumption are related to world price levels. This conclusion is supported by Kohout (43) and Nores (50). The estimated price elasticity of foreign demand for Argentine beef ranges from -1.25 to -2.40, which is high (table

33/ As reflected by a comparison of the Liniers Central Market price; export prices of Argentine beef, f.o.b. Buenos Aires; and international prices as reflected in the Smithfield Market in London and beef prices in Hamburg.

37). Furthermore, each successive devaluation of the peso has increased foreign demand for Argentine beef and has seemed to act as a strong stimulus for domestic prices (7, pp. 23-28; 50, pp. 71, 102, 193; 43).

Table 36.--Argentine domestic and export beef prices, 1955-70

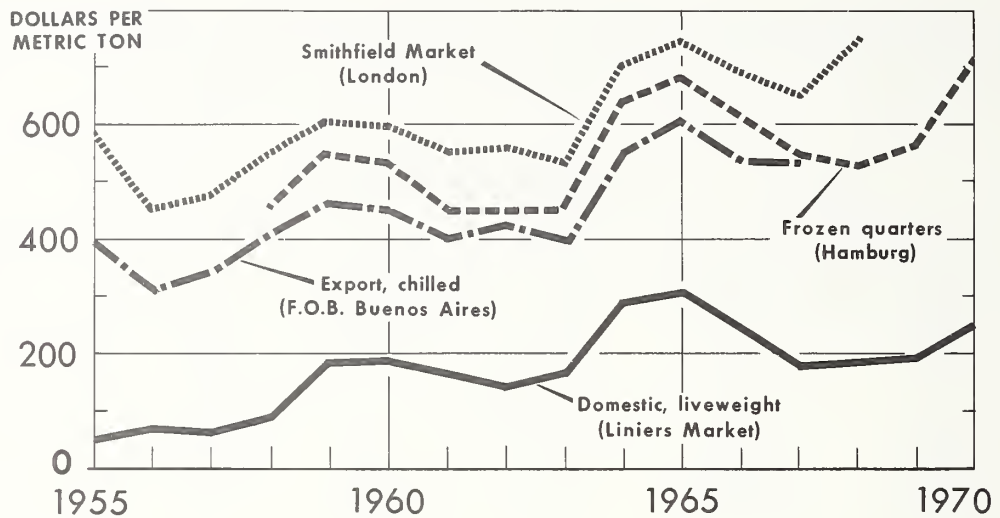
Year	: Domestic : (all cattle)	: Export : f.o.b.	: Smithfield : B.A.	: Export : c.i.f.
	: <u>1/</u>	: <u>2/</u>	: <u>3/</u>	: Hamburg <u>4/</u>
	Dollars per metric ton			
1955	51.80	399	592	n.a.
1956	64.11	319	457	n.a.
1957	61.99	345	476	n.a.
1958	78.46	413	553	458
1959	181.37	461	605	542
1960	182.72	452	598	531
1961	166.34	400	547	453
1962	141.26	422	559	441
1963	165.33	395	534	450
1964	288.69	556	707	647
1965	301.52	603	746	682
1966	241.46	5/537	688	612
1967	180.06	6/528	6/656	550
1968	183.52	n.a.	6/746	530
1969	191.05	n.a.	n.a.	566
1970	252.50	n.a.	n.a.	716

1/ Liniers Market-liveweight average weighted price of all cattle, converted into dollars at the average exchange rate of the year. 2/ Chilled Argentine beef. 3/ Simple average of quarterly quotations--quarterly quotations are averages of daily transactions for Argentine chilled beef quarters.

4/ Source: Reuters Meat Report, data on Argentine frozen quarters. 5/ 6-month average, Jan.-June. 6/ 6-months average, June-Dec.

Source: Unless otherwise stated, (37. 1957-68).

ARGENTINE DOMESTIC AND EXPORT BEEF PRICES



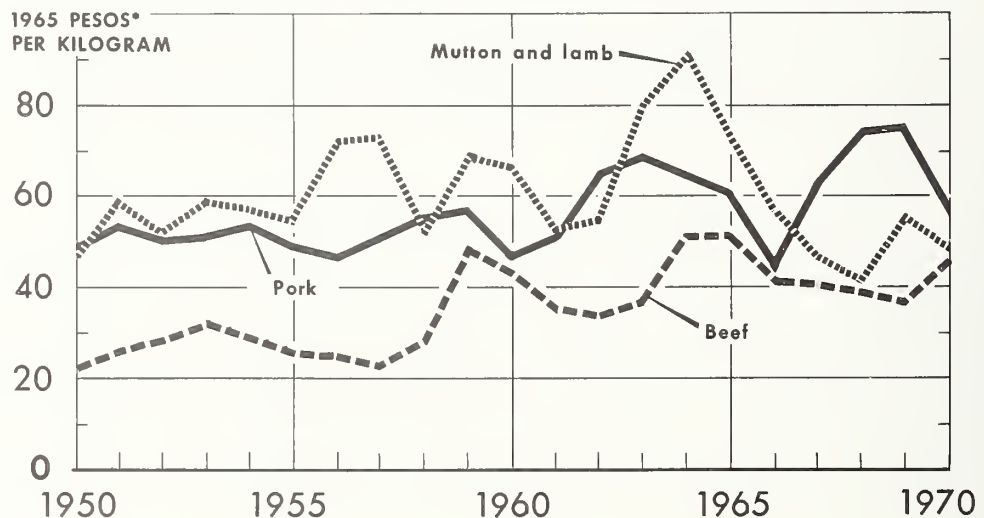
SOURCE: TABLE 36

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Figure 13

ARGENTINE BEEF, PORK, AND MUTTON AND LAMB PRICES



*LINIERS MARKET LIVELWEIGHT PRICES FOR BEEF AND PORK AND AVELLANEDA MARKET LIVELWEIGHT PRICES FOR MUTTON AND LAMB, DEFLATED 1965 PESOS

SOURCE: TABLE 34

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Figure 14

Table 37.--Estimated price elasticity of foreign demand for Argentine beef

Product	Data used	Nature of the model	Form of the model	Estimated or computed elasticity
I. Chilled beef, U.K. <u>1/</u>	Annual data, 1956-61	Single equation	Linear in the variables	-1.9
II. Chilled beef, U.K. <u>2/</u>	Quarterly data, 1963-65	Single equation	Linear in the variables	-2.4
III. Chilled beef, U.K. <u>3/</u>	Quarterly data, 1963-65	Single equation	Constant elasticity	-1.9
IV. Refrigerated beef, all: beef, all destinations <u>3/</u>	Annual data, 1935-66	Simultaneous equations	Linear in the variables	-1.25

1/ Herrmann, L. F., and R. E. Branson, A Program for Stabilizing Argentine Beef Exports, Special Report to CAFADE/USAID-Argentina, Buenos Aires, 1962, as given by Nores in (50). 2/ Nores, G., "British Demand for Argentine Beef," unpublished paper presented in Ag. Econ. 605, Purdue University, 1967, as given in (50). 3/ Computed on the basis of estimates I and II by Nores in (50).

Demand Elasticities

Population and income are the two principal shifters of demand. Population growth over the past decade has been estimated at 1.5 percent per year, while real per capita net national income growth has been less than 1 percent per year (table 38). Most of the growth in total quantities consumed has been due to population growth.

Quantity-Income Elasticities

Consumption of beef appears to be inelastic to price changes and even more inelastic to income changes. Calculated income demand elasticities are generally weak, ranging from 0.16 in Nores (50) to 0.41 in Otrera (54). CONADE-JNC (14) arrived at slightly larger income demand elasticities of 0.42 to 0.51 (table 39).

The Indicative World Plan of FAO (60) indicates that income elasticities for meat and meat products and corn in Argentina may be close to zero, while that of wheat may even be -0.1 (table 39). INTA's regression analyses indicate income elasticities for beef and pork of around 0.4 and 0.8, respectively, while giving wheat and corn respective figures of -0.04 and 1.3 (55). Apparently, the average Argentine consumer has reached a saturation level of consumption of wheat. This does not appear to be the case for other grains or for meats. However, the lack of fluctuation in incomes probably causes inconclusive regression results.

Table 38.--Argentine population and total and per capita gross domestic product at factor cost, 1960-69 and projected to 1975

Year	Population	GDP	Per capita GDP
	Thou.	Bil. 1965 pesos	1,000 pesos
1960.	20,669	2,716	131
1961.	21,011	2,910	139
1962.	21,350	2,860	134
1963.	21,688	2,793	129
1964.	22,019	3,083	140
1965.	22,352	3,363	150
1966.	22,691	3,388	149
1967.	23,031	3,474	151
1968.	23,366	3,628	155
1969.	23,705	3,922	165
1970.	24,050	--	--
1971.	24,389	--	--
1972.	24,733	--	--
1973.	25,082	--	--
1974.	25,436	--	--
1975.	25,796	--	--
		Percent	
Annual growth rates: 1950-59	1.9	3.8	1.8
1960-69	1.5	4.4	2.8
1970-75	1.4	--	--

-- means not projected.

Source: Population, (33). GDP, Banco Central de la Republica Argentina: Origen del producto y distribucion del ingreso, Anos 1950-69, Buenos Aires, Jan. 1971.

Price Elasticities

INTA gives a few estimates of price elasticities of demand (33). All are in-elastic and indicate that price is a less important factor for small grains, beef, or mutton and lamb than for corn, pork, or poultry.

Other studies have attempted to measure beef consumption response to price and income changes. The responses, as measured by the price elasticity of demand at the average value of the period of analysis, ranged from as low as -0.20 calculated by Otrera (54) to -0.77 calculated by CONADE-JNC (14). INTA (33), Guadagni and Petrecolli (30), and Nores (50), concentrating on different periods from 1935 to 1967, came up with similar price elasticities within the range of -0.44 to -0.48. In addition, Guadagni and Petrecolli calculated a long-range demand-price elasticity of -0.53, which does not differ substantially from their short-range elasticity of -0.48. This suggests that the adjustment period of the quantity demanded to price change is close to 1 year. Therefore, a 1-percent real increase in the retail price of beef may reduce its consumption by close to 0.5 percent (table 39).

Table 39.--Quantity income and price elasticities of demand for Argentine grains and livestock

Commodity	Income : elasticity	Price : elasticity	Source	Time period of analysis
Wheat. . . .	$\frac{1}{2}$ /-0.10 $\frac{2}{2}$ /-.04	$\frac{3}{3}$ / $\frac{3}{3}$ /	IWP/FAO (<u>26</u>) INTA (<u>33</u>)	-- 1945/46-1965/66
Corn	nil 1.3	-0.62	IWP/FAO (<u>26</u>) INTA (<u>33</u>)	-- 1947-65
Barley, oats, and rye . .	3.12	-.14	INTA (<u>33</u>)	1951/52-1965/66
Meat and products. .	nil	$\frac{3}{3}$ /	IWP/FAO (<u>26</u>)	--
Beef . . . .	.37 .26 .18 to .38 .42 to .51 .41 .16	-.44 -.30 -.48 -.32 to -.77 -.20 -.46	INTA (<u>33</u>) Guadagni (<u>29</u>) Guadagni & Petrecollla (<u>30</u>) CONADE-JNC (<u>14</u>) Otrera (<u>54</u>) Nores (<u>50</u>)	1950-67 1914-59 1935-61 1942-62 1945-64 1935-66
Mutton and lamb. . . .	0	-.18	INTA (<u>33</u>)	1946-67
Pork . . . .	.84	-.76	INTA (<u>33</u>)	1947-64
Poultry. . .	$\frac{3}{3}$ /	-.75	INTA (<u>33</u>)	1945-65

1/ Semilog functions. 2/ Estimated from wheat flour data. 3/ Not computed.

Pork, mutton and lamb, and poultry prices are higher than beef prices (fig. 14). Argentine consumption patterns indicate that none of the three has competed with beef in consumption. Thus, changes in their prices have little effect on the consumption of beef. Guadagni and Petrecollla found the cross-price elasticities of beef demand with respect to pork, mutton and lamb, and "other food" to be very low and statistically not significant (7, pp. 20-22; 43, pp. 76-77; 30).

VII. MAJOR FACTORS AFFECTING GROWTH POTENTIAL THROUGH 1975

Future increases in Argentina's production of grains and livestock will have to come through higher land productivity, since most land is currently being utilized. Limited land expansion can take place only at relatively high cost. Higher production will come from either more intensive use of currently available or newly developed technology or increased use of inputs.

No major breakthroughs in grain or livestock technology are expected in Argentina through 1975. Perhaps around 1975, new grain varieties may start to be available, but they will probably not have a significant impact until much later.

Grain farms are already fairly well mechanized. Most improvements will come from improved moisture-saving tillage, better timing of plantings, minimum tillage, and increased bulk handling of grains both on and off the farm.

There is considerable room for increased productivity of present pastures. An increase would raise the carrying capacity per hectare, which could free land for increased grain production or more livestock. According to the FAO Indicative World Plan, "Present research in the more humid Pampa indicates that improved pasture, utilizing adapted temperate legumes (alfalfa), could release 2 hectares of every 3 now under unimproved conditions, providing modern technology is utilized. . ." (26, p. 107). While this figure appears high, it does indicate the possibility of longer run improvements. Certainly the use of legumes coupled with more intensive soil conservation practices, drainage, and flood controls could do much to improve the productivity of presently used land, but these improvements will be slow and should have little impact by 1975.

The degree of stability, direction, and assistance provided by the Government of Argentina will be an important factor affecting farm plans and production. The establishment in May 1971 of a separate Ministry of Agriculture headed by a cabinet member may help agricultural development. ^{34/} Among the agricultural problems facing the Government are few improved rural roads, limited rural educational facilities and other infrastructure, underutilization of land, insufficient numbers of veterinary and extension personnel and economists, and high cost of inputs. ^{35/}

Wheat: Growth Potential

With present varieties and technology, production of wheat is limited to present growing areas. It will continue to be used as a cash crop and for pasture. Competition from rye, barley, and oats will be minimal because of their lower gross returns per hectare (table 10). Yields and prices are generally higher for wheat than for the other small grains in the Pampa Provinces. Oilseeds, while a cash crop, do not provide the pasture risk insurance of small grains. Hence, they are not expected to compete heavily in livestock-grain operations.

^{34/} From 1966 until 1971, the Secretary of State of Agriculture was under the Ministry of Economy.

^{35/} A good illustration of the multiphased problems facing the Government is given by the decision priorities and recommendations of Fienup et al. in (24, pp. 359-361).

A continuation through 1974/75 of trends that have occurred since 1954/55 would give a slight increase in wheat area planted and harvested as well as in production (table 40). For wheat production to substantially exceed 7.5 to 8.0 million tons--projected by this study under the more likely of two alternative assumptions--without larger increases in area and under normal weather conditions, yields must be improved. New varieties which respond economically to fertilizer are necessary. Coupled with this is a need for lower cost fertilizer. INTA is now working with the Mexican dwarf varieties to develop a dwarf wheat adapted to Argentine conditions. When a successful variety is developed, at least 3 years will be needed to put it into commercial use. If fertilizer prices, largely nitrogen prices, were lowered either through fuller use of present plant capacities or through use of subsidies, more fertilizer would be used and yields might be increased. Wider use of rotations with legumes and more careful fallow use might also help increase yields.

Corn: Growth Potential

Corn production is not likely to shift significantly to new Provinces through 1975. Earlier maturing varieties have already shifted corn production further south in Buenos Aires Province. However, the danger of early fall or late spring frosts reduces the potential in this area. Sorghum may be the biggest competitor for corn area but this will be limited to the drier corn-growing regions. Gross returns per hectare of corn are higher than for other grains in Santa Fe and Cordoba Provinces (table 10). Except in Entre Rios and perhaps La Pampa, gross returns for corn are high enough to offset the lower production costs advantage of sorghum. The combination of higher corn yields and higher corn prices will encourage corn rather than sorghum production in zones with adequate rainfall.

An extension of past trends from 1954/55 and 1959/60 to 1974/75 would result in corn production of 9.7 to 10.4 million tons (table 41). This would come from a larger area harvested and higher yields. If area harvested were held at the 1969/70 peak level of around 4.1 million hectares, yields would have to be 2.5 tons per harvested hectare to provide a 10.4 million-ton production. Trend extensions of yields range from 2.4 to 2.5. Therefore, it should not be too difficult to reach the higher production level with no increase in area harvested.

Higher yields could come from a wider use of fertilizers coupled with newer hybrid seeds more responsive to fertilizer. More fertilizer on present varieties would increase yields in areas of poorer soil fertility. Only about half of the producers representing 70 percent of the corn acreage follow INTA's recommended procedures regarding such things as time of planting, seedbed preparation, and plant population (24, p. 195). Corn yields--now about half those in the United States--could increase considerably with improved practices, newer varieties, and more fertilizer. Improvement will be gradual, however, and no big breakthroughs are expected.

Sorghum Grain: Growth Potential

Sorghum grain production expanded rapidly during 1950-70. Production went from practically nothing to over 700,000 tons in the 1950's and reached almost 3.9 million tons in 1969/70 (app. table 7). Sorghum grain is popular with producers for a variety of reasons. Gross returns per hectare are higher than for rye, barley, and oats in the drier Provinces of the Pampa although less than for wheat and corn. They are higher than for all other grains outside the Pampa (table 10). Also, sorghum has a planting pattern similar to corn's but has lower production costs; and it can grow in a dry zone or in a drought. Sorghum can also be used as an emergency pasture. Continued production growth can be expected, therefore, but future growth should be less rapid than in the recent past.

Table 40.--Linear time trend extensions for Argentine wheat 1/

Item	Actual		Trend extensions				Adjusted trend extensions 2/			
	1965/66- 1969/70		1954/55-1969/70		1959/60-1969/70		1954/55-1969/70		1959/60-1969/70	
	1965/66- 1969/70	1969/70	1974/75	R ²	1974/75	R ²	1974/75	R ²	1974/75	R ²
Area planted	6.309	6.239	6.705	.27	7.942	.71	--	--	--	--
Area harvested	5.331	5.191	5.699	.13	6.690	.43	5.742	.13	6.800	.52
Production	6.481	7.020	7.391	.03	8.106	.06	7.495	.04	8.373	.14
Yield	1.220	1.352	1.298	.01	1.187	.05	1.305	-.04	1.220	.002

-- means Not computed

1/ Area in million hectares. Production in million metric tons. Yield in metric tons per harvested hectare. The R² is the multiple R² corrected for degrees of freedom. 1954/55 = 1, 1974/75 = 21.

2/ Includes dummy variable to eliminate from the time trend the most violent fluctuations due to weather; 1974/75 projection assumes normal weather.

Table 41.--Linear time trend extensions for Argentine corn 1/

Item	Actual		Trend extensions				Adjusted trend extensions 2/			
	1965/66- 1969/70		1954/55-1969/70		1959/60-1969/70		1954/55-1969/70		1959/60-1969/70	
	1965/66- 1969/70	1969/70	1974/75	R ²	1974/75	R ²	1974/75	R ²	1974/75	R ²
Area planted	4.362	4.666	5.197	.92	5.539	.98	--	--	--	--
Area harvested	3.535	4.090	4.395	.94	4.522	.92	4.390	.94	4.504	.92
Production	7.564	9.440	9.664	.79	10.420	.76	9.672	.78	10.350	.75
Yield	2.240	2.308	2.371	.42	2.463	.43	2.390	.46	--	--

-- means Not computed.

1/ Area in million hectares. Production in million metric tons. Yield in metric tons per harvested hectare. The R² is the multiple R² corrected for degrees of freedom. 1954/55 = 1, 1974/75 = 21.

2/ Includes dummy variable to eliminate from the time trend the most violent fluctuations due to weather; 1974/75 projection assumes normal weather.

Table 42.--Linear time trend extensions for Argentine sorghum 1/

Item	Actual		Trend extensions				Adjusted trend extensions 2/			
	1965/66- 1969/70		1954/55-1969/70		1959/60-1969/70		1954/55-1969/70		1959/60-1969/70	
	1965/66- 1969/70	1969/70	1974/75	R ²	1974/75	R ²	1974/75	R ²	1974/75	R ²
Area planted	1.872	2.569	2.894	.95	2.989	.88	--	--	--	--
Area harvested	1.171	1.872	1.822	.84	1.987	.74	1.793	.90	1.919	.95
Production	2.342	3.820	3.535	.77	3.862	.64	3.463	.85	3.695	.91
Yield	2.000	2.041	2.026	.03	1.926	.003	2.023	.04	1.884	.06

-- means Not computed.

1/ Area in million hectares. Production in million metric tons. Yield in metric tons per harvested hectare. The R² is the multiple R² corrected for degrees of freedom. 1954/55 = 1, 1974/75 = 21.

2/ Includes dummy variable to eliminate from the time trend the most violent fluctuations due to weather; 1974/75 projection assumes normal weather.

A simple continuation of past production trends (1954/55 through 1969/70 and 1959/60 through 1969/70) gives a production range of 3.5 to 3.9 million tons in 1974/75 (table 42). This implies a slight increase in area harvested and no overall improvement in yields. Yields fluctuated but showed no real trend, up or down, over the last decade and a half. For example, yields averaged 2.5 tons per hectare in 1957/58 and 1965/66, 1.8 tons during 1955/56-1959/60 and 1960/61-1964/65, and 2.0 in 1965/66-1969/70. If the record-high yield for 1965/66 is ignored, the yield for the later period averages 1.9 tons, just over 50 kilograms per hectare above the previous period's average.

Sorghum grain yields may continue to improve slightly through 1975, but movement into fringe or marginal production areas should limit the rise. Increased production should come through use of more land in the drier fringe zones of the Pampa Provinces and in the Chaco region.

The simple time trend extension of production and yields of sorghum is probably conservative. If the trend in area continues, and around 2.0 million hectares are harvested at 2.3 tons per hectare in 1974/75, the resulting production would be around 4.6 million tons. This figure may be more realistic than the similar production extensions of 3.5 to 3.9--which were already reached in 1969/70.

Beef: Growth Potential

In the Pampa, cattle breeds are of high quality. Efforts of ranchers and experiment stations are continuing to improve breeds and to develop cattle more suitable for the subtropical climate in the Northeast and the Chaco. Experiments with Zebu and Santa Gertrudis breeds are noteworthy. The proportion of unfinished steers brought into the traditional finishing zone from the Northeast and the Chaco is increasing, so the contribution of these regions to cattle production may be expected to increase to some extent. It is doubtful, however, that cattle breeding and fattening will shift from the Pampa to any noticeable extent within the foreseeable future.

In the Pampa, cattle grazing competes with grains but also is complementary. The increase in cattle prices after 1958 caused more seeded grain area to be used for forage--not only seeded area of the traditional small grains, but also that of wheat, corn, and sorghum (18). Although area under pasture in the Pampa is not expected to increase, cattle-carrying capacity will continue to increase through better management of pastures and use of grains for forage.

If the 1950-70 slaughter trend and tendency to market lighter weight animals continue, beef production will increase at about 2.1 percent per year, reaching close to 3 million tons in 1975. This means domestic beef consumption could be maintained at the 1966-70 average level of 80.5 kilograms per capita and exports could be increased from 700,000 tons to nearly 900,000 tons in 1975. However, if per capita consumption is maintained at the 1969 level of 88 kilograms, exports will not increase.

To increase beef production enough to maintain high domestic consumption and at the same time increase exports, a major effort would be required on the part of producers and the Government. Substantial improvements seem possible in four areas:

(1) Increasing the carrying capacity of pastures through conversion of natural pastures to improve seeded pastures, coupled with rotational grazing.

(2) Increasing the use of feed storage and supplementary feeds to avoid periodic depletion of cattle stocks during severe winters and periods of drought. Present stock fluctuations are wide.

(3) Providing better veterinary services to increase the calving rate from the present 72 percent to about 80 percent (a rate consistent with extensive grazing), and to decrease the mortality rate of calves.

(4) Reducing the percentage of young calves slaughtered from the 1967-69 average of over 10 percent to a level such as 5 percent, which prevailed in the mid-1950's.

The first area is the most promising and practical at present. Improvements there could have an even greater effect if the supplemental feeding suggested in item 2 above is used. Higher beef prices in absolute terms and relative to grains would encourage these improvements, as would Government assistance in terms of longer term low-interest credit--particularly to medium-sized and small producers--and more extensive services to improve herd management. Veterinary services are scarce except in the case of disease control, such as for aftosa.

Supplemental grain feeding to prevent stock depletion during drought periods or to maintain higher stock levels is relatively expensive. The present beef/grain price ratio does not make it economical, except perhaps during emergency periods and over a relatively short period of time at maintenance rather than fattening levels. Using 1965-69 averages, the beef/grain price ratio 36/ in Argentina was about 5 for wheat and corn and 6 for sorghum grain, compared with U.S. ratios of 10 for wheat, 11 for corn, and 12 for sorghum grain. The substantial decrease of grain prices and the increase of beef prices in Argentina in 1970 increased the beef/grain ratio to 6 for wheat and a little over 7 for sorghum grain. A further increase in the ratio or a stabilization of 1971 prices may encourage grain feeding. This could help reduce cycle intensity and increase beef production.

In 1965, the Secretariat of Agriculture planned to promote the seeding or re-seeding of 5 million hectares of permanent pastures over the next 5 years, increasing their productivity 30 percent (53, p. 118). This should have permitted meat production in 1970 to reach close to 3.0 million tons instead of the 2.6 million tons achieved. The reseedling goal was not accomplished and the increased meat production was not achieved even though 1969 and 1970 were cyclically high production years.

If the pasture improvement program could be carried out at the rate of 1 million hectares per year through 1975 so as to increase meat production per hectare from 150 to 300 kilograms, meat production in 1975 could reach 3.3 to 3.4 million tons rather than the trend value of about 2.7 million tons. 37/ These figures indicate the upper limit of improvement in meat production under existing technical conditions. The 1970-74 Plan of the National Development Council--which included improvement in herd management, sanitary control, genetic breed selection, building up of forage reserves, and pasture improvement--projected a possible increase of beef production of 2 percent per year (15, p. 44). If this were achieved, meat production would increase to close to 2.8 million tons.

36/ The ratios were computed from the following : Argentine prices: For beef--Liniers Central Market, pesos per kg. liveweight; for grains--hard and semihard wheat, red corn, and sorghum on wagon, bulk in Buenos Aires. U.S. prices: For beef--beef steers, standard, in Chicago per lb. liveweight; for grains--No. 2 soft red winter wheat in Chicago; and No. 3 yellow corn and No. 2 yellow sorghum, both in Kansas, per lb.

37/ Extrapolated 1950-70 trend.

VIII. PROJECTIONS THROUGH 1975

This chapter contains projections of Argentina's production potential in wheat, corn, sorghum, and beef through 1975 under alternative assumptions.

Originally, only two price and demand assumptions were considered: (1) that 1970 meat and grain price levels would prevail through 1975; and (2) that meat prices would remain at the 1970 level but grain prices would fall 15 percent. In both cases, world demand was assumed to be sufficient to absorb whatever quantities of beef and grain Argentina would export at these price levels.

Our analysis indicated these assumptions were too restrictive for the following reasons:

(1) 1970 price levels for grain were relatively low compared with levels of preceding recent years.

(2) Beef prices in 1970 were relatively high compared with prices in preceding recent years, but moved up even more sharply in 1971.

(3) The strength and consistency of a roughly 6-year beef cycle in Argentina make the path of beef prices between 1970 and 1975 as important as, or more important than, any particular hypothesis of a given price level for the period as a whole.

(4) Argentine Government policy with respect to domestic beef supplies and prices, and the level of exports, must be considered an important influence in beef production, beef prices, and beef export availabilities.

For these reasons, beef projections under the two original price and demand assumptions were augmented by a more detailed analysis incorporating assumptions more appropriate to the Argentine situation. These projection alternatives provide greater scope for evaluating the beef production and export possibilities of Argentina during 1971-75.

Projections in Other Studies

Supply and demand projections for these commodities in Argentina have been made in other studies, the principal ones being: (1) The Indicative World Plan for Agricultural Development to 1975 and 1985--Regional Study No. 2, South America--The Food and Agriculture Organization of the United Nations, Rome, 1968. (2) Argentina-- Projections of Supply of and Demand for Selected Agricultural Products Through 1980-- Instituto Nacional de Tecnologia Agropecuaria, Buenos Aires, 1969. (3) The National Development Plan, 1970-74--Secretaria del Consejo Nacional de Desarrollo (CONADE), Buenos Aires, 1970. (4) The National Development Plan, 1971-75, for which only a few 1975 projections are available without supporting analysis. (5) World Demand Prospects for Grains in 1980--U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Report 75, Washington, D.C., 1971.

These studies used annual population growth rates that range from 1.4 percent (INTA) to 1.7 percent (CONADE) (table 43). Annual changes in income range from 3.0 to 5.5 percent, with CONADE again using the higher rate. The differences in these rates and in the selected base periods help explain the differing projected levels of production, consumption, and export availabilities.

Table 43.--Projections of production, apparent consumption, and export availability of selected agricultural commodities in Argentina, 1975

Item	IWP/FAO 1/ 2/		CONADE 2/		CONADE 2/		USDA 1/ 2/ 3/		Annual percent change between	
	Base, : 1975 : 1961-63;projec-:1962-66;projec-:		Base, : 1975 : 1966-68 : actual :		Base, : 1975 : 1974 : projections :		Base, : 1975 : 1964-66;projec-:1967-74;:USDA : actual :tions :		base and projections	
	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :	actual :tions :
Income	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Population (1,000 persons)	21,351	26,257	22,020	25,796	23,143	26,131	22,354	26,257	3.6	5.5
									1.4	1.7
Wheat:										
Area seeded 4/	5/3.93	6.78	5.45	5.32	6.21	5.58	n.a.	n.a.	4.2	-2
Yields 6/	1.3	1.5	1.2	1.6	1.1	1.6	n.a.	n.a.	1.0	2.6
Production 7/	5.21	10.50	7.41	8.57	6.55	9.14	7.90	9.20	5.5	1.2
Consumption 7/	3.58	4.50	3.67	4.12	3.23	4.10	3.90	4.40	1.7	1.0
Export availabilities 7/	1.63	6.00	3.74	4.45	3.32	5.24	4.00	4.80	10.4	1.5
Per capita consumption 8/	168.	171.	167.	160.	139.	149.	174.00	168.00	-1.1	-4
										1.0
Corn:										
Area seeded 4/	5/2.72	3.70	3.62	3.90	4.18	5.05	n.a.	n.a.	2.4	.7
Yields 6/	1.8	1.9	1.4	1.7	1.8	1.9	n.a.	n.a.	.3	1.7
Production 7/	4.81	7.22	5.42	6.95	7.37	9.72	n.a.	n.a.	3.1	2.2
Consumption 7/	2.44	2.23	2.23	3.25	3.29	5.00	n.a.	n.a.	2.7	3.4
Export availabilities 7/	2.37	3.19	3.70	4.08	4.72	7.70	n.a.	n.a.	3.5	1.2
Per capita consumption 8/	114.	132.	101.	126.	142.	191.	n.a.	n.a.	1.1	2.0
										4.4
Sorghum:										
Area seeded 4/	n.a.	n.a.	1.19	2.33	1.56	2.28	n.a.	n.a.	n.a.	6.2
Yields 6/	n.a.	n.a.	1.1	1.4	1.2	1.4	n.a.	n.a.	n.a.	2.2
Production 7/	n.a.	n.a.	1.32	3.21	1.80	3.08	n.a.	n.a.	n.a.	8.4
Consumption 7/	n.a.	n.a.	.78	1.94	1.06	1.70	n.a.	n.a.	n.a.	8.6
Export availabilities 7/	n.a.	n.a.	.64	1.27	.74	1.38	n.a.	n.a.	n.a.	6.4
Per capita consumption 8/	n.a.	n.a.	35.	75.	46.	65.	n.a.	n.a.	n.a.	7.2
										5.1
Beef:										
Numbers slaughtered 2/	n.a.	n.a.	10.86	13.92	12.20	15.59	n.a.	n.a.	n.a.	2.2
Average weight 10/	n.a.	n.a.	210.	202.	202.	208.	n.a.	n.a.	n.a.	-3
Meat production 7/	2.43	3.14	2.26	2.81	2.46	3.24	n.a.	n.a.	1.9	1.9
Consumption 7/	n.a.	n.a.	1.67	2.07	1.84	2.34	n.a.	n.a.	n.a.	1.9
Export availabilities 7/	n.a.	n.a.	.59	.74	.62	.90	n.a.	n.a.	n.a.	2.0
Per capita consumption 8/	n.a.	n.a.	76.	80.	80.	90.	n.a.	n.a.	n.a.	.5
										1.7
All meat:										
Production 7/	3.36	4.34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.9	n.a.
Consumption 7/	2.67	3.31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.6	n.a.
Exports 7/ . . . . .	.69	1.03	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3.1	n.a.
Per capita consumption 8/	125.	126.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.0	n.a.
										n.a.

1/ Consumption (total and per capita) is an average of the high and low projection levels. 2/ Export availability is a residual of production less consumption except for residual. 3/ Production and consumption projections are taken from projection set I, which assumes that present food and fiber policies in the less developed countries will continue, allowing for moderate gains in technology and productivity. 4/ Area in million hectares. 5/ Area harvested. 6/ Yield in metric tons per hectare. 7/ Population consumption, and export availability in million metric tons. 8/ Calculated by dividing total consumption by population. Total per capita apparent consumption includes feed, seed, and waste. 9/ Numbers slaughtered in million head. 10/ Average weight in kilograms per head, carcass weight.

Sources: IWP/FAO, (26); INTA, (33); CONADE, (15 and 58, Jan. 1971); USDA, (59) and (31).

Wheat production levels projected for 1975 range from 8.4 to 10.5 million tons, with apparent consumption 38/ ranging from 4.1 to 4.5 million tons. 39/ Implied wheat export availabilities range from 4.3 to 6.0 million tons.

Corn production levels projected for 1975 range from 7.0 to 13.0 million tons, consumption from 3.3 to 5.3 million tons, and export availabilities from 3.7 to 7.7 million tons.

Sorghum projections for 1975 were made only by INTA, and for 1974 only by CONADE. The two sets are relatively close--production of around 3.2 million tons, consumption of around 1.9 million tons, and export availabilities of 1.3 million tons. 40/

Beef production projections for 1975 range from 2.8 to 3.2 million tons. Beef consumption projections, which are available only from INTA and CONADE, are 2.0 to 2.3 million tons. Beef export availabilities range from 740,000 to 1.0 million tons.

Projections Under Restrictive Price Assumptions

As indicated above, we originally envisaged only two price assumptions--the first assuming constant 1970 prices for grains and livestock and the second assuming constant 1970 livestock prices and a 15-percent decline in grain prices. 41/ To the extent possible, projections using these assumptions were built on the results of the projection studies mentioned above, supplemented by the results of this study.

Past grain production and price trends are not very useful for projection purposes under different price assumptions, because other factors appear to be as important as price in producer decisions (ch. VI). The steady growth in area planted to corn and sorghum despite price fluctuations is a case in point, and gives little variation for use in a statistical price analysis. Wheat alone has sufficient variation.

Several multiple regression equations developed in the course of this study and fitted to data for 1954/55-1969/70 produced results generally similar to those of the INTA study, despite our use of a more recent period. Signs for price coefficients were usually negative or insignificantly different from zero. The substitution of lagged gross returns per hectare for price made little improvement in the statistical fit. Time was usually the best explainer of past changes in area planted or harvested, which means simply that no single variable or combination of variables such as prices could be isolated to explain changes in area planted.

38/ Includes all domestic disappearance--human consumption, feed, seed, waste, and stock changes.

39/ The CONADE study projected human consumption only.

40/ CONADE's 1974 projections are slightly lower than those of INTA for 1975. With a small upward adjustment they approximate those of INTA.

41/ These price assumptions are not very realistic. Beef prices in Argentina are likely to continue up through 1971, then trend downward before starting up again by 1975, following the characteristic Argentine beef cycle. Wheat support prices were raised relative to prices of the other grains for the 1971/72 crop year in an effort to stimulate larger wheat production. By 1975, all grain prices are likely to be higher than they were in 1970.

The price relationships for beef cattle are better, and selected equations were used for projecting. However, the precise number of beef cattle in Argentina is unknown, which gives an imprecise base from which to project.

Projections Assuming 1970 Price Levels

These projections assume a continuation of present trends in technology and resource availability, as well as 1970 relative prices. The 1970 prices for wheat, corn, and sorghum in Argentina were low relative to their prices during the latter half of the 1960's. The opposite is true of beef prices, but even so, beef prices continued sharply upward in 1971. If these 1970 prices remained frozen, as is assumed for this set of projections, beef production would receive more resources relative to grain production than has been the case in the recent past or would be the case in the future with relatively higher grain prices. Pasture improvement would be more rapid, more grains would be used as forage, and production of the three major grains would increase at a rate slightly less rapidly than during the late 1960's (table 44).

Grain projections under this assumption essentially imply a dampening of recent past trends in area planted and percentage of area harvested, because lower relative grain prices would encourage more use of grain area for forage. Projected yields, largely extensions of recent trends, assume that improved management practices will continue to gradually increase wheat and corn yields at about the rate prevailing in recent years. Sorghum yields are held constant because of an assumed expansion into drier, marginal areas.

Projected apparent consumption of grain is based on a consideration of past trends, an assumed -0.3 income elasticity for wheat, a zero income elasticity for human use of other grains, an assumed population growth rate of 1.4 percent per year, ^{42/} and a very gradual increased use of grains for poultry and livestock (mostly pigs) feed.

Beef consumption is based on an equation which used trend and price as the determinants of per capita consumption. Projected export availabilities are the residual, and assume that the world market will absorb all exports at 1970 prices.

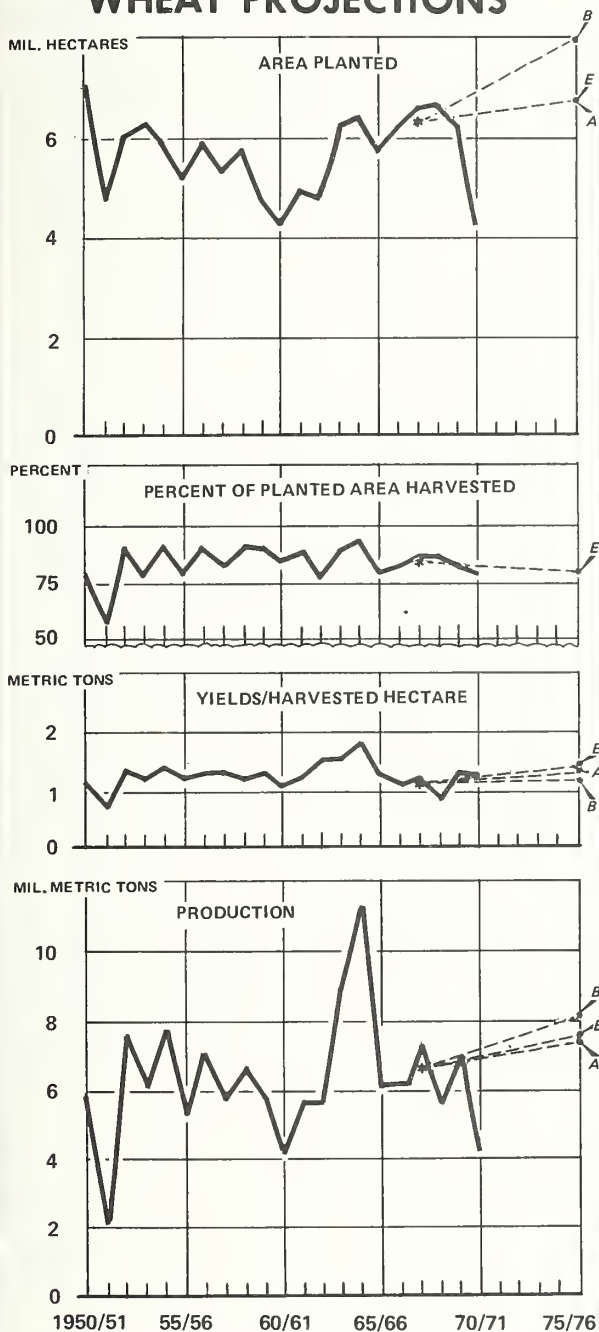
Wheat production.--Wheat area planted is projected at 6.7 million hectares, of which 80 percent (5.4 million) will be harvested as grain (fig. 15 and table 44). Yields are projected at 1.4 tons per hectare, giving a production of 7.6 million tons. In this case, area harvested would be 4 percent, yields 4 percent, and production 8 percent higher than in 1969/70, but lower than peaks that occurred in the 1960's.

Corn production.--Corn area planted is projected at 5.0 million hectares (fig. 16). Harvested area would be 85 percent, or 4.25 million hectares, with a yield of 2.4 tons per hectare. Production would reach 10.2 million tons. Projected area harvested is 6 percent higher than in 1969/70. Yields are 3 percent higher, and production is 9 percent higher.

Sorghum production.--Sorghum grain area planted is projected at 3.4 million hectares, of which 75 percent (2.55 million hectares) would be harvested (fig. 17). Production would be 5.1 million tons, because yields are assumed to hold their 1969/70 level of 2.0 tons per hectare. Projected area planted and projected production are 32 and 34 percent higher than 1969/70 levels but only 9 percent higher than preliminary estimates of area planted and production for 1970/71.

^{42/} Preliminary reports from the 1970 Argentine population census indicate that population growth may be about 1.2 percent per year. This is lower than has been assumed in this study.

ARGENTINA: WHEAT PROJECTIONS



A = 1954/55 TD 1969/70 TREND

B = 1959/60 TD 1969/70 TREND

E = ESTIMATED LEVELS AT 1970 PRICES

* = FOR 1967/68, INDICATES 5-YEAR AVERAGE 1965/66-1969/70

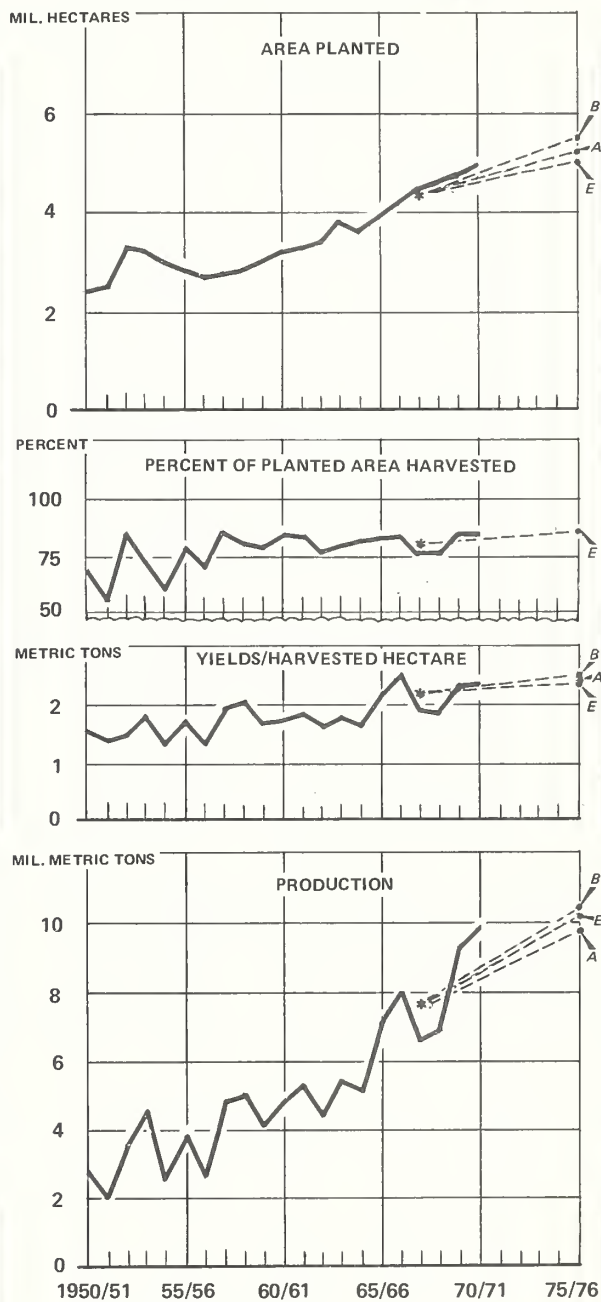
SDURCE: TABLES 40 AND 44 AND APPENDIX TABLE 7

U.S.D.A.

NEG. ERS 8627 - 72 (1)

Figure 15

ARGENTINA: CORN PROJECTIONS



A = 1954/55 TD 1969/70 TREND

B = 1959/60 TD 1969/70 TREND

E = ESTIMATED LEVELS AT 1970 PRICES

* = FOR 1967/68, INDICATES 5-YEAR AVERAGE 1965/66-1969/70

SDURCE: TABLES 41 AND 44 AND APPENDIX TABLE 7

U.S.D.A.

NEG. ERS 8628 - 72 (1)

Figure 16

Table 44.--Production, consumption, and export availabilities for Argentine wheat, corn, sorghum, and beef, 1965/66-1969/70 and projected to 1975

Commodity and item	Unit	Actual		Projected 1975	
		1965/66-	1969/70	Under	Under low-
		1969/70		1970 price	er grain
				assumptions	prices
Wheat:					
Area planted.	Million hectares	6.31	6.24	6.70	5.70
Area harvested.	do.	5.33	5.19	5.40	4.30
Yield	Metric tons	1.22	1.35	1.40	1.40
Production.	Million metric tons	6.48	7.02	7.60	6.00
Apparent consumption. . .	do.	4.08	4.09	4.28	4.28
Per capita consumption. . .	Kilograms	174	170	166	166
Export availability . . .	Million metric tons	2.95	2.28	3.32	1.72
Domestic price.	1965 pesos/100 kgs.	929	811	811	690
Corn:					
Area planted.	Million hectares	4.36	4.66	5.00	4.78
Area harvested.	do.	3.54	4.02	4.25	3.82
Yield	Metric tons	2.14	2.33	2.40	2.40
Production.	Million metric tons	7.56	9.36	10.20	9.17
Apparent consumption. . .	do.	3.37	3.90	3.61	3.88
Per capita consumption. . .	Kilograms	144	162	140	150
Export availability . . .	Million metric tons	4.20	5.46	6.59	5.29
Domestic price.	1965 pesos/100 kgs.	888	867	867	737
Sorghum:					
Area planted.	Million hectares	1.87	2.57	3.40	3.36
Area harvested.	do.	1.17	1.87	2.55	2.35
Yield	Metric tons	2.00	2.04	2.00	2.00
Production.	Million metric tons	2.34	3.82	5.10	4.70
Apparent consumption. . .	do.	1.17	1.72	1.94	2.23
Per capita consumption. . .	Kilograms	50	72	75	86
Export availability . . .	Million metric tons	1.10	1.70	3.16	2.47
Domestic price.	1965 pesos/100 kgs.	687	638	638	542
Beef:					
Number slaughtered. . . .	Million head	12.60	12.81	12.96	13.53
Carcass weight/animal . .	Kilograms	204	204	204	204
Production.	Million metric tons	2.57	2.61	2.64	2.76
Apparent consumption. . .	do.	1.90	1.96	2.01	2.01
Per capita consumption. . .	Kilograms	80.7	81.6	78.1	78.1
Export availability . . .	Million metric tons	.67	.65	.63	.75

Oats, barley, and rye production.--Production of these three grains was not projected. However, a balanced picture cannot be presented without including them in the discussion. If past trends continue (as they probably will), the combined production of these three grains will be 1.2 to 1.6 million tons in 1974/75, with little change in yields from the 1969/70 period (fig. 18).

Grain area planted but not harvested.--It is assumed that most of the grain area planted but not harvested will be pastured by cattle. The above projections imply a total grain forage area of 5.8 million hectares in 1974/75, composed of 1.3 million in wheat, 0.7 million in corn, 0.8 million in sorghum, and 3.0 million in oats, barley, and rye. This combined total is slightly more than the 5.6 million-hectare level of 1969/70. It reflects the assumed lower grain price relative to that which prevailed in the late 1960's.

Beef production.--Beef production since 1950 has moved with a strong cyclical pattern, although the length and amplitude vary. Beef prices move cyclically opposite to production, but there is apparently a 3-year lag as production adjusts to prices. Three separate beef projection sets are presented later, which assume different levels of cyclical price movements. Of those, set I production is used here because in it beef price levels in 1972 approximate those of 1970. Beef prices in 1972 should influence beef production in 1975 most heavily because of the cyclical path of beef prices and production. Although the 1972 price of 46.07 pesos per kilogram is identical to the 1970 price, beef prices are assumed to have peaked in 1971 at 50.56 pesos per kilogram and then to decline to 33.00 pesos per kilogram in 1974 before starting upward again (table 45).

Given the assumption of 1970 prices and a continuation of past cyclical movements in cattle slaughter with a slight decrease in weight per slaughtered animal, beef production would fall from 2.61 million tons in 1970 to a low of 2.41 million tons in 1972, peak at 2.75 million tons in 1974, and be on the down cycle to around 2.64 million tons in 1975 (table 44 and fig. 21). Beef production in 1975 would be about 30,000 tons higher than in 1970 after having been more than 140,000 tons higher in 1974. In 1975, about 13 million head would be slaughtered at an average carcass weight of 204 kilograms (fig. 21 and table 46).

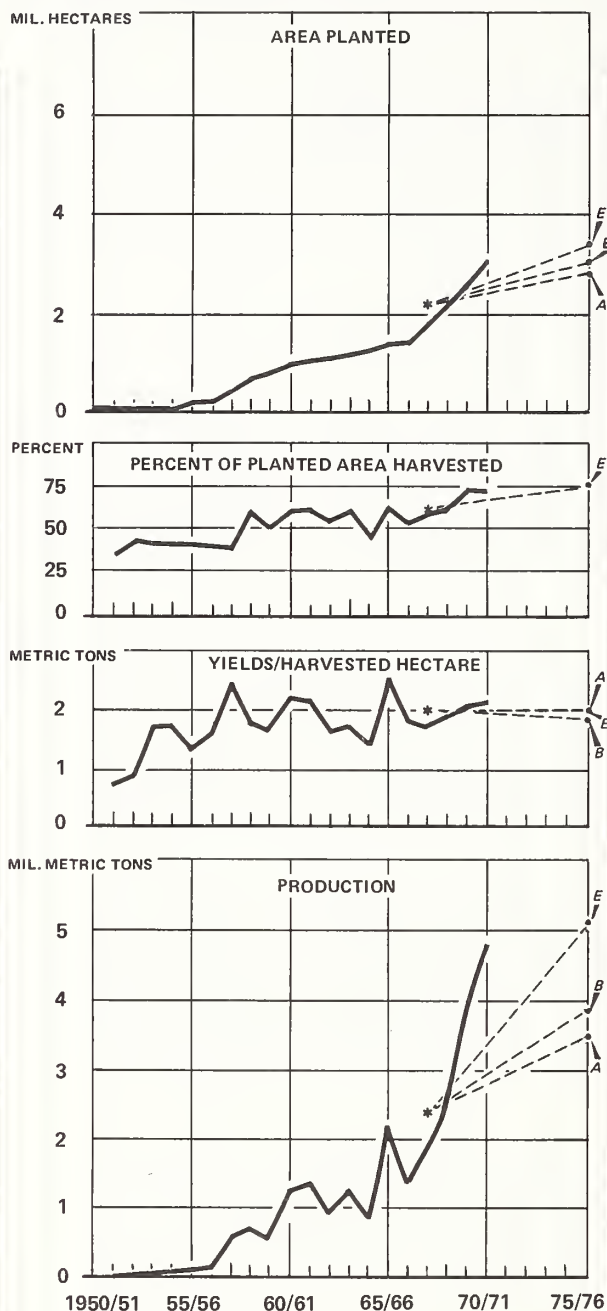
Apparent consumption--wheat, corn, grain sorghum, and beef.--Estimates of per capita consumption (for all purposes including food, feed, seed, waste, starches, and so forth) were selected at 166 kilograms of wheat, 140 kilograms of corn, and 75 kilograms of sorghum (fig. 19). These levels are above those of most of the 1960's, but the wheat and corn levels are less than the 1965/66-1967/68 averages of 179 and 143 kilograms, respectively. Sorghum consumption is well above the 1965/66-1967/68 average of 46 kilograms.

With these per capita levels, a population growth rate of 1.4 percent, and a 1975 population of 25.8 million, projected total apparent domestic consumption in 1975 would be 4.28 million tons of wheat, 3.61 million tons of corn, and 1.94 million tons of sorghum. These levels are 5 and 13 percent higher than the respective total consumption levels of 1969/70 for wheat and sorghum, and 7 percent below the 1969/70 levels for corn.

Projected per capita beef consumption, using the equation presented on page 96 and 1970 prices, is 78 kilograms in 1975. This is slightly lower than the 1966-70 average of 81 kilograms, and gives a total consumption of just over 2 million tons.

Implied export availabilities.--Residual or implied export availabilities for 1975 are 3.3 million tons for wheat, 6.6 million tons for corn, 3.2 million tons for sorghum, and 630,000 tons for beef (table 44). For corn, this figure is higher than exports during the 1950's and 1960's. The sorghum figure would be record high. Wheat and beef figures are about the same as recent average levels.

ARGENTINA: SORGHUM PROJECTIONS



A = 1954/55 TO 1969/70 TREND

B = 1959/60 TO 1969/70 TREND

E = ESTIMATED LEVELS AT 1970 PRICES

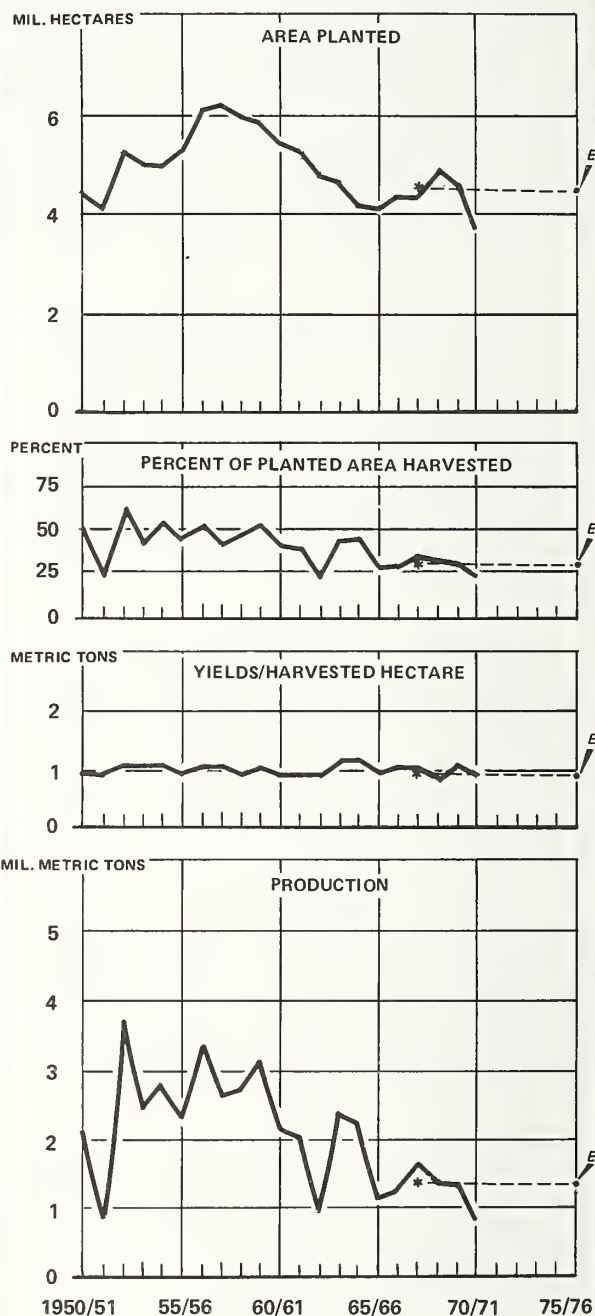
* = FDR 1967/68, INDICATES 5-YEAR AVERAGE 1965/66-1969/70

SDURCE: TABLES 42 AND 44 AND APPENDIX TABLE 7

U.S.D.A.

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ARGENTINA: OATS, BARLEY, AND RYE PROJECTIONS



E = ESTIMATED LEVELS AT 1970 PRICES

SDURCE: APPENDIX TABLE 8

* = FDR 1967/68, INDICATES 5-YEAR AVERAGE 1965/66-1969/70

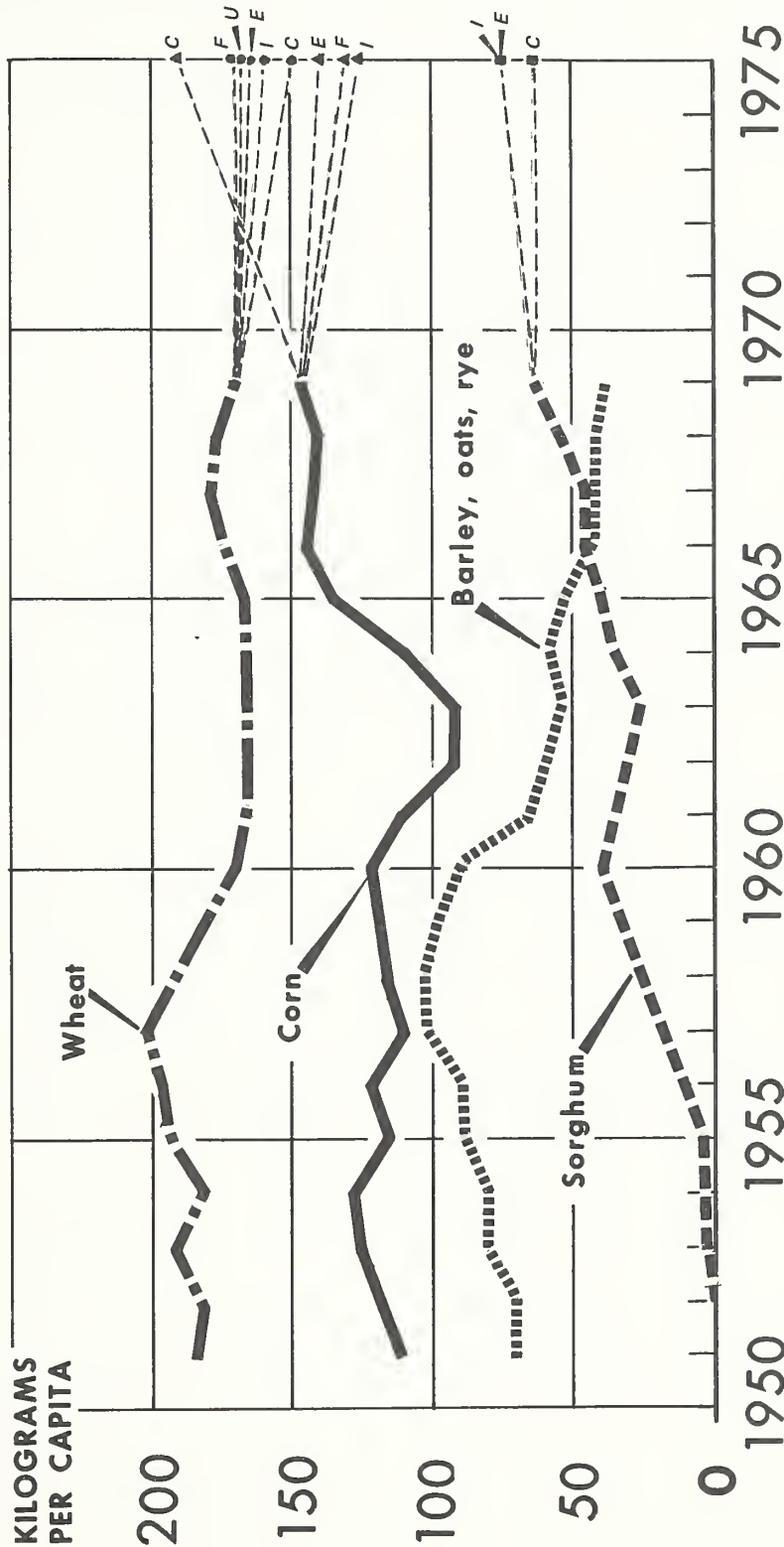
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NEG. ERS 8630 - 72 (1)

Figure 17

Figure 18

ARGENTINA: PROJECTIONS OF PER CAPITA CONSUMPTION OF GRAINS



SOURCE: TABLES 43 AND 44 AND APPENDIX TABLES 7 AND 8

PROJECTIONS: C = CONADE (15); F = FAO (26); I = INTA (33);

U = USDA (59); E = ESTIMATE AT 1970 PRICE LEVELS.

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Figure 19

Comparisons with other projections.--Production, consumption, and exports in 1975 under the assumption of constant 1970 prices for grains and livestock compare as follows with projections in the studies discussed above (tables 43 and 44).

(1) Projected wheat production and exports are considerably below those of all other studies, but above actual 1969/70 levels and average 1965/66-1969/70 levels. Consumption is about the same level as projected by the other studies.

(2) Projected corn production and exports are considerably above those of all other studies except the recently revised Argentine plan for 1971-75, for which no supporting analysis is yet available. Our projected levels of production and exports appear to be more reflective of recent trends than projections in all studies except the Argentine 1970-74 plan, which has been revised upward for 1975. Projected consumption is in line with projections of INTA and the IWP but is over a million tons less than projected by both Argentine plans.

(3) Projected sorghum production is well above that projected in the other two available studies, and exports are about twice as high. Production and exports of sorghum in 1969/70 were already above the 1975 levels projected in other studies. Our consumption projection agrees closely with that of INTA. It exceeds the Argentine 1970-74 plan projection.

(4) Projected beef production and exports are well below those projected in all other studies. Production is projected higher than the actual level in 1969/70 or in 1966-70, but exports are projected slightly lower. The Argentine 1971-75 plan's production level is sharply reduced from the 1970-74 plan's level, but the export level is higher. To achieve the higher export level, a sharp reduction in domestic beef consumption is implied, but explanations of the plan revisions were not available. Our projected consumption falls between that of INTA and the Argentine 1971-74 plan.

Projections Assuming Lower Grain Prices

The second set of projections carried out in this study assumes a maintenance of 1970 livestock prices and a 15-percent reduction in grain prices from 1970. It further assumes that producers have time to adjust to the new grain-price levels and that they expect them to be relatively permanent. With livestock prices at 1970 levels but grain prices down 15 percent, a further increase in resources going to cattle production is expected. A 15-percent reduction is not large, but when combined with the already relatively low 1970 grain price and the relatively high 1970 beef price, a substantial shift in the grain/beef price ratio would occur. Alternative crops such as sunflower or flaxseed would become more attractive on a relative basis, but would not provide the emergency pasture needed for any increased cattle production. No shifts in grain yields are expected.

Production.--Assuming longrun price-area planted elasticities of 1.0 for wheat, 0.3 for corn, and 0.1 for sorghum (tables 30 and 32), the area planted to each would decline by 15.0, 4.5, and 1.5 percent, respectively, from the projected levels made under 1970 price assumptions. This would mean a reduction in area planted of 1.0 million hectares for wheat, 220,000 hectares for corn, and 4,000 hectares for sorghum. An arbitrary reduction in the percentage of planted area harvested of 5 percentage points to permit a slightly larger share of grain area to be used as forage, is also assumed. Given these conditions, grain production would be 6.0 million tons of wheat, 9.2 million tons of corn, and 4.7 million tons of sorghum. These are reductions of 21, 10, and 8 percent, respectively, from levels projected under a constant 1970 grain price. The projected area planted but not harvested implies an increase of around 470,000 hectares of grain area used as forage over the constant-price projections and an increase of nearly 600,000 hectares over the actual 1969/70 level.

Since statistically significant cross-price elasticities for beef with respect to grain are not available, we cannot estimate directly the beef supply response to a change in grain price. However, a rough estimate of the possible response can be obtained from the use of projection set III (tables 45 and 46), which uses a beef price in 1972 that is about 10 percent higher than in 1970 (see p. 93 for detailed explanation). Use of this set assumes that the increase in real beef prices of 10 percent will approximate the effect of a 15-percent decrease in relative grain prices. Projected production under set III increases to 2.76 million tons of beef in 1975, or about 4.5 percent above the projection under the 1970 beef price assumption. 43/

Apparent consumption.--Lower grain prices should have little impact on wheat consumption, perhaps a small impact on corn consumption, and a larger impact on sorghum consumption. Given higher relative prices for livestock, some additional corn and sorghum would be fed. However, the limited use of supplemental feeding in the past makes it impossible to estimate the impact. To allow for a small price impact, a zero demand price elasticity for wheat is assumed, along with demand price elasticities of -0.5 for corn and -1.0 for sorghum. These imply no change in wheat consumption, a 7.5-percent increase in corn consumption, and a 15-percent increase in sorghum consumption. No impact would be expected on beef consumption.

Export availabilities.--Given the above, the implied export availabilities for wheat are 1.7 million tons, for corn 5.3 million tons, for sorghum 2.5 million tons, and for beef 0.75 million tons. The grain figures represent a decrease of 48, 20, and 22 percent in export availabilities from the 1970 constant price projections. The beef figure represents an increase of 19 percent, or 120,000 tons, in additional export availabilities.

Comparison With Other Projections

With a 15-percent lower grain price in 1975 than in 1970, but with beef prices at the 1970 level, these projections compare with those in other projection studies as follows:

(1) Wheat production in 1975 is 2.4 million to 4.5 million tons below other projections, and wheat exports are severely reduced (tables 43 and 44). However, production is only half a million tons below the average 1965/66-1969/70 level and 1 million tons below the 1969/70 level. Exports in 1975 go down correspondingly but are only 60,000 tons less than those of 1969/70.

(2) Corn production by 1975 is below levels in the Argentine 1970-74 and 1971-75 plans, but above the IWP and INTA projections. Exports are above those projected in the latter two studies, about the same as the projection in the Argentine 1970-74 plan, but much below the sharp upward revision in the 1971-75 plan.

(3) Sorghum production and exports in 1975 are well above other projections and well above actual 1965/66-1969/70 average levels, but about the same as preliminary estimates for 1970/71.

(4) Beef production in 1975 is below all other projections. Exports are slightly greater than projected by INTA but much below the level projected in either the 1970-74 or 1971-75 Argentine plan. Production and exports are both above average 1965-70 levels but slightly below 1969's record level.

43/ This gives an implied cross-price response elasticity of -0.3, (+ 4.5/-15).

As indicated earlier, the assumption of a constant 1970 beef price prevailing through 1975 seemed far too confining and unrealistic an assumption for an analysis of the future of beef production and exports in Argentina. Therefore, we made several alternative sets of beef projections, using results from our analysis of the past three decades of Argentine beef production. Especially considered were results of analysis of the response of beef production to changes in prices (ch. VI), of the livestock sector's potential (ch. VII), and of Argentine Government policy, particularly as it influences prices, domestic beef consumption, and the quantities of beef for export.

Beef Production and Prices

Beef cattle slaughter numbers increased during 1945-70 at an annual rate of about 1.8 percent. This trend, however, has been subject to wide cyclical fluctuations, which coincide very closely with cyclical price movements. We evaluated several statistical functions and found the following cattle slaughter function the most acceptable to use to project the number of cattle slaughtered.

Cattle slaughter function (period of analysis, 1948-70):

$$SB = 6,084.326 + 119.266 PB_{t-3} + 49.300 T$$

$$R^2 = .59 \quad t = 2.85 \quad 0.87$$

$$DW = 1.23 \quad E = 0.388$$

Where:

SB = slaughter of beef cattle in thousand head;

PB_{t-3} = price of beef per kilogram liveweight at Liniers
Market in constant 1965 pesos, lagged 3 years;

T = time with 1948 = 1, and 1975 = 28;

t = "t" test statistic;

E = elasticity computed at the means;

DW = Durbin-Watson test statistic

While only the coefficient of price per kilogram of beef lagged 3 years (PB_{t-3}) was statistically highly significant (0.99 confidence level), technological changes (T) cannot be eliminated in the equation, because even with relatively stable prices from 1945 to 1958, cattle slaughter had a positive trend. ^{44/}

We tried to measure the influence of grain prices on beef production and found connection between the two to be statistically insignificant. We therefore eliminated grain prices from the projecting equation. This does not mean grain prices do not influence beef production, but that the influence is probably obscured by other factors such as weather, disease, and Government policies.

^{44/} Technological change (T) includes, in addition to what is commonly understood, other factors which cause movements over time but which cannot be identified or explained.

To use the beef cattle slaughter function given above, price for the projection period had to be projected independently. For this purpose, a cosine function was fitted to the beef price data for 1959-70 and used to project cyclical prices through 1975.

Cattle price cycles in the 1950's and 1960's lasted about 6 years. In 1959-70, the range of cyclical swings was close to 28 pesos.

Function for price movements (1959-70):

$$PB = A + BT + V \cos (1/3 \pi T)$$

Where:

PB = price of beef per kilogram liveweight at Liniers Market in constant 1965 pesos;

T = time with 1959 = 1, and 1975 = 17;

B = trend coefficient;

V = cycle amplitude;

π = mathematical constant of 3.142

Using the model, we made three separate price projections. Projection I reflects the assumption that prices will continue to fluctuate cyclically through 1975 as they did through 1959-70 at about that period's average of 41.78 pesos per kilogram live-weight, with the standard deviation of 6.10 pesos (± 6 PB). The cyclical swings were calculated as 8.78 pesos about the mean ($\pm 1.44 \pm 6$ PB), implying a 0.85 confidence level for upward and downward limits of the cycle. ^{45/} Under this assumption, prices were projected to reach their peak of 50.56 pesos in 1971, decline to a low of 33.00 pesos by 1974, and then begin a recovery (table 45 and fig. 20). This assumption is consistent with price movements through June 1970, but prices moved sharply above this trend after that.

Projection II assumes that Argentine beef prices will continue to move upward in steps and that the sharp increase in beef prices in 1971 marks a new step. This assumption is consistent with price stickiness at the top as demonstrated in the past (fig. 20). In figure 20, the dashed horizontal lines running from 1943 to 1958 and from 1959 to 1970 indicate the tendency of beef prices to move up, or to be allowed to move up, and then remain at the new higher level. By June 1971, steer prices in Liniers Market had increased to the average of 66.75 constant 1965 pesos per kilogram liveweight (58, Apr. 22, 1971, p. 557; 28, June 25, 1971). During the 1960's, cattle prices in Liniers averaged 3.13 pesos per kilogram below steer prices. On this basis, average cattle prices in Liniers in 1971 were about 63.62 pesos per kilogram, a 38-percent real increase over 1970. Assuming this price to be at its peak, and that cyclical swings remain the same as in the recent past, but at a much higher average level than in 1959-70, the average price on a new step level from 1971 through 1975 is estimated at 54.84 pesos per kilogram (63.62 less 8.78--the third dashed line (1971-75) in fig. 20). Thus, projection II assumes 1971-75 prices will fluctuate around a 54.84 peso average within cyclical limits as in projection I (that is $PB = 54.84 + 8.78 \cos (1/3 \pi T)$). Under this assumption, prices decrease from the peak of

^{45/} The fitted function is $PB = 41.78 + 8.78 \cos (1/3 \pi T)$.

Table 45.--Fluctuations in Argentine beef prices, 1959-75, estimated from a cosine function

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1/ Angle in radians; denotes period of a cycle. A cosine function cycle occurs every 2π , which equals a price cycle of 6 years. 2/ Beef prices in 1965 constant pesos per kilogram live weight at Liniers Market. 3/ Prices projected to move about the period average, $P = 41.78$, with the standard deviation, $\hat{\sigma}_p = 6.10$, deflated 1965 pesos, as a cosine function, $PB = 41.78 + 8.78 \cos(1/3 \pi T)$ where $1.44 \hat{\sigma}_p$, or 8.78 is the cycle amplitude, implying 0.85 confidence limits for cyclical variations. 4/ Prices projected to move from 1971 to 1975 about the estimated new average of 54.84, deflated 1965 pesos, within cyclical confidence limits as in projections I. 5/ $P = 21.340 + 0.897 T$ with $\hat{\sigma}_p = 0.159$, $\hat{\sigma}_{AT} = 6.068$, and $r = 0.756$. 6/ Price projected as a function $PB = 21.340 + 0.897 + 8.74 \cos(1/3 \pi T)$, where $1.44 \hat{\sigma}_{P.T.}$, or 8.74 pesos is the cycle amplitude, implying 0.85 confidence limits for cyclical variations. $T = 1$ in 1945.

63.62 pesos in 1971 to 46.06 pesos by 1974 and then begin a new upswing. This assumption is consistent with price conditions prevailing in 1971 and with what could be expected to happen if the June 1971 price level does not prove to be artificially high.

Finally, projection III assumes that prices will resume their long-term trend. The projected price thus increases to 54.28 pesos in 1971, then cyclically declines to 39.49 pesos by 1974, and is followed by a recovery which ought to reach its peak around 1977. This assumption implies that the 1971 price was artificially high and that average prices will fall but will settle at a level above the 1959-70 average.

Because the cattle slaughter projections are based on prices lagged 3 years, reflecting the price responsiveness of beef production in the past, only 1971 and 1972 projected prices will influence cattle slaughter through 1975. Under these prices, the number of cattle slaughtered reach their lowest point in 1972; then increase to a maximum in 1974 of 13.4, 15.0, and 13.9 million head under projections I, II, and III respectively; and then begin a cyclical decline (table 46).

Assuming the continuation of a 25-percent slaughter rate (the average for 1966-70), the cattle slaughter projections imply an increase in cattle numbers from 48.6 million head in 1970 to about 54 million head in projection I, 60 million head in projection II, and 56 million head in projection III during 1971-75.

Beef production is a function of the number of cattle slaughtered and the average weight of slaughtered animals. The long-term trend seems to be toward lighter weight slaughtered animals. The average weight depends on climatic conditions, which cannot be predicted, as well as on prices. Almost all cattle are pasture fed. In times of good pastures, cattle are retained on farms for fattening to heavier weight. In times of drought or severe winters, lighter weight animals are marketed. Similarly, when cattle prices decline, farmers tend to market lighter weight animals in anticipation of a further price decline. When prices are rising, cattle are retained for further fattening in anticipation of further price increases.

In calculating beef production, we adopted the following simple trend function to calculate average carcass weight for 1945-75:

$$WB = 215.855 - 0.385 T$$

$$R^2 = .21 \quad t = 2.48$$

Where:

WB = average carcass weight of slaughtered beef cattle;

T = time (1945 = 1, and 1975 = 31)

The results give an average carcass weight of 205.5 kilograms in 1971, declining to 203.9 kilograms by 1975. Using these weights, beef production under projection

46/ That is, along the line $P = 21.340 + 0.897 T$, with the standard error of T coefficient ($\hat{\sigma}_T$) of 0.159, the standard error of the estimate ($\hat{\sigma}_{P.T.}$) of 6.068 and $r = 0.756$. $T = 1$ in 1945. This trend was used to modify the cosine function which becomes $PB = 21.340 + 0.897 T + 8.74 \cos(1/3 \pi T)$. The cycle amplitude is $\pm 1.44 \hat{\sigma}_{P.T.}$ or 8.74 pesos, implying again 0.85 confidence limits for cyclical up and downward swings.

declines from 2.61 million tons in 1970 to 2.41 million tons in 1972, increases to 2.75 million tons in 1974, and then begins a cyclical decline. Under projections II and III, maximum beef production occurs in 1974--3.07 and 2.84 million tons, respectively (table 46 and fig. 21).

Beef Consumption and Exports

To project per capita beef consumption (carcass weight), we used the following function derived from 1950-70 consumption data.

$$PCC = 118.396 - 1.103 PB_t + 0.404 T$$

$$R^2 = .93 \quad T = 13.24 \quad 3.12$$

$$DW = 2.74$$

Where:

PCC = per capita consumption of beef in kilograms, carcass weight, in year t.

PB_t = price of beef per kilogram liveweight in Liniers Market;

T = time (1950 = 1, and 1975 = 26)

Since retail beef prices follow closely Liniers Market prices, we used the latter as being more reliable. Using the three sets of projected prices, we made three separate projections for per capita beef consumption. Per capita beef consumption under projection I, where beef prices are lowest, decreases from 82 kilograms in 1970 to 72 kilograms in 1971; increases to 92 kilograms by 1974; and then begins a decline again as prices begin a new cyclical upward movement. Projection II shows a decline in per capita beef consumption in 1971 to 57 kilograms, and then an increase to its high level of 78 kilograms in 1974. In projection III, the low point occurs in 1971--67 kilograms per capita. The high point is in 1974--85 kilograms (table 46).

Export availability of beef from Argentina in the projected period is the difference between production and total consumption, under the three assumed price levels. Projection I results in an increase in consumption over recent levels. Export availability therefore declines from 648,000 tons in 1970 to 380,000 tons in 1975. The rate of decline, however, is rapidly decreasing. Projection II, which assumes the maintenance of high beef prices and a consequent decrease in per capita consumption, increases export availability to a cyclical high in 1974 of 1.09 million tons followed by a small cyclical decline in 1975. Finally, projection III, with beef prices resuming a secular increase, results in an export availability stabilizing at the recent level of close to 700,000 tons, with mild upward cyclical movements (table 46 and fig. 21).

Implications of the Beef Projections

The last three projection sets show potential Argentine beef exports in 1975 ranging from 380,000 tons to 1,070,000 tons. These exceed the upper and lower limits of the five projection studies discussed earlier.

Of course, the projected cyclical movements are subject to disturbances caused by weather, disease, and Government policies. These influences could easily spread out or reduce the cycle as well as change its intensity.

Table 46.---Beef supply and distribution in Argentina, 1970 and projected to 1975

Year and projection set :	Slaughter : 1/	Carcass : weight per animal 2/	Beef : production : 3/	Total : consumption : 4/	Export : availability 5/	Percent of :	
						production :	consumption :
	: 1,000 head	: Kilograms	: - - - 1,000 metric tons - - -			Percent	Kilograms
1970.	12,815	203.6	2,610	1,962	648	25	81.6
Projection I:							
1971 7/	11,862	205.5	2,438	1,744	694	28	71.5
1972.	11,748	205.1	2,410	1,902	508	21	76.9
1973.	12,868	204.7	2,634	2,180	454	17	86.9
1974.	13,446	204.3	2,747	2,343	404	15	92.1
1975.	12,959	203.9	2,642	2,262	380	14	87.7
Projection II:							
1971 7/	11,862	205.5	2,438	1,395	1,043	43	57.2
1972.	11,746	205.1	2,410	1,543	867	36	62.4
1973.	12,868	204.7	2,634	1,816	818	31	72.4
1974.	15,003	204.3	3,065	1,976	1,089	36	77.7
1975.	14,529	203.9	2,962	1,891	1,071	36	73.3
Projection III:							
1971 7/	11,862	205.5	2,438	1,644	794	33	67.4
1972.	11,746	205.1	2,410	1,771	639	26	71.6
1973.	12,868	204.7	2,634	2,024	610	23	80.7
1974.	13,889	204.3	2,838	2,160	678	24	84.9
1975.	13,525	203.9	2,758	2,051	707	26	79.5

1/ Calculated from the function $SB=6,084.326 + 119.266 PB_{t-3} + 49.300 T$ with the standard error of PB coefficient of 41.879 and of T coefficient of 56.440, and $R^2=0.59$, where SB=slaughter of beef cattle; PB=price of beef per kilogram of liveweight in Liniers Market in 1965 pesos; T=time; 1948=1; 1971=24; and 1975=28. Projections I, II, and III--low, high, and medium (most likely) projections--reflect the 3 assumed price movements in 1971-75 as shown in table 45. 2/ Carcass weight per animal slaughtered=215.855-0.385 T, where T=1 in 1947, 27 in 1971, and 31 in 1975. 3/ Carcass weight: Number of animals slaughtered times average carcass weight per animal. 4/ Projected per capita consumption times projected population. 5/ Difference between production and total consumption. 6/ Calculated as a function where $PCCB=118.396-1.103 PB_{t+0.404} T$, with the standard error of PB coefficient of 0.083 and of T coefficient of 0.130, and $R^2=.93$; where PCCB=per capita consumption of beef; PB=price of beef per kilogram liveweight in Liniers Market; T=time; 1950=1; 1971=22; and 1975=26. 7/ At the time of printing, the most recent estimates for 1971 were lower than the projections. They indicate the slaughter of 10.0 head of cattle; beef production of 2.0 million tons; total consumption of 1.518 million tons; per capita consumption of 62.1 kilos; and exports of 482,000 tons (28).

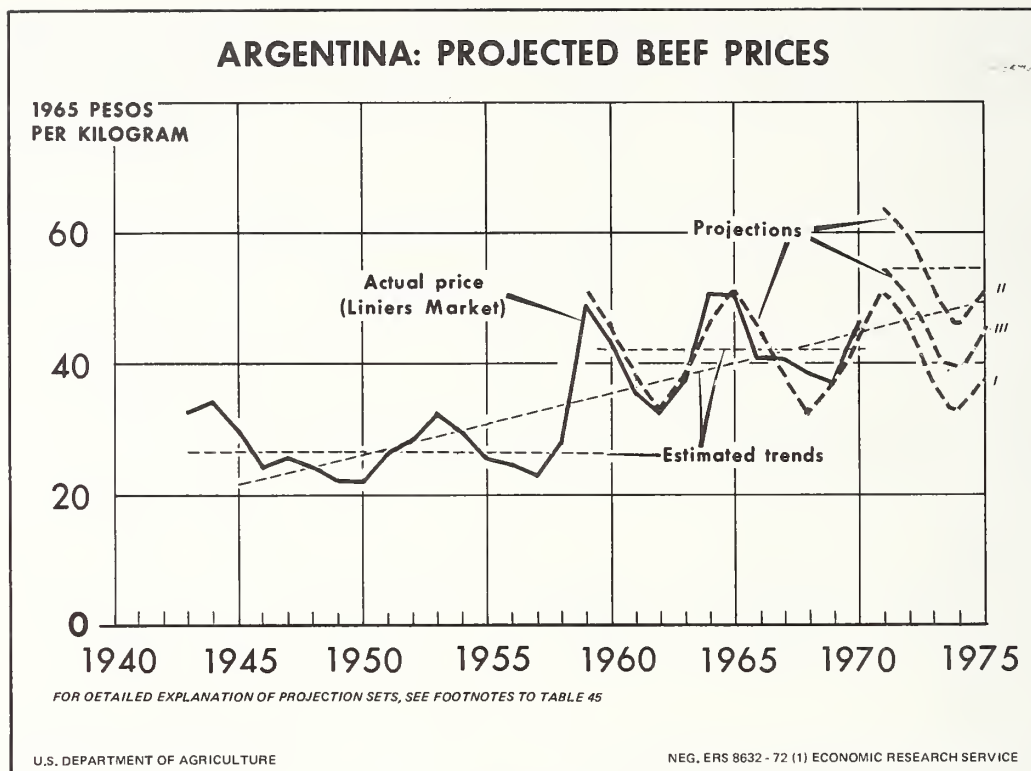


Figure 20

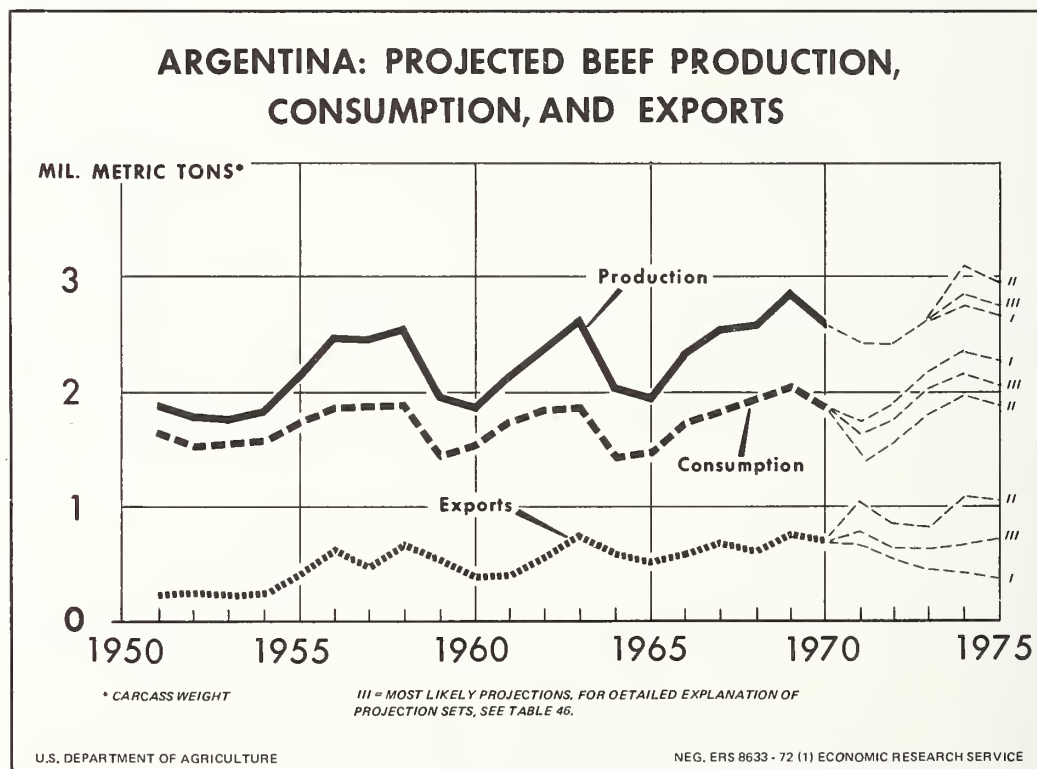


Figure 21

Underlying each projection set are some critical assumptions about the nature of world demand for and supply of beef, Argentina's influence on both, and the extent to which the Argentine Government allows the world market to influence Argentine domestic production and consumption.

World demand for beef was not considered in this study. Because it is so critical a factor in determining the path of Argentine beef production, consumption, and trade through 1975, however, some points should be noted.

Current world demand for beef is quite strong, and long-range studies indicate a continued strong movement upward. Both Argentina and Australia have responded with a sizable buildup in beef herds, which has withheld beef from the market and contributed to further pushing up domestic cattle prices. Their actions also influence world prices, since combined they supply a large share of world exports. The actual movement of beef prices and supplies in the next 3 or 4 years in each of these countries will depend on how the supply of beef forthcoming from present herd buildups will affect their domestic markets and the world market.

The most critical assumption in projection set III (the most likely set) is that the Argentine Government will continue a policy of attempting to maintain relatively low beef prices for domestic consumption and high levels of exports. Recent Government measures to restrict domestic consumption in an effort to ensure larger exports, and efforts to curtail domestic prices to ensure "traditional" distribution of domestic consumption, are an indication of the strong pressures working to perpetuate these policies.

Projection set III also assumes that world demand for beef will continue strong, but that the current high prices partly reflect shortrun reduced supplies from Argentina and Australia. Both countries have significantly reduced slaughter and appear to be rapidly building up herds because of the high prices. When these supplies eventually enter the domestic and export market as beef, some of the heavy pressure on prices will be relieved.

Projection set II, which increases beef exports over the next 5 years to over 1 million tons (near the levels projected in the Argentine 1970-74 and 1971-75 plans), implies a sharp reduction in domestic consumption (fig. 21). Although this is implicit in the Argentine Government's 1971-75 plan (table 43), it will be difficult for the Government to continue to restrict domestic consumption when export levels reach 700,000 tons.

Projection set II, assumes that the sharp upward movement of real beef prices in Argentina in 1970 and 1971 reflects an upward shift in world demand for beef. In this projection set, the new Argentine and Australian supplies will produce a continuation of the price cycle, but at much higher levels than previously. Argentine producer prices will decline, but will be kept from falling as low as in earlier years by domestic and world demand. Pasture and herd number constraints will be the significant shortrun constraints on the production side.

In contrast, projection set I produces a level of domestic consumption so high and a level of exports so low as to seem unlikely. This high level of consumption is partly the result of the assumption that world demand for beef is much "softer" than it appears at present. This projection set assumes that when Argentine and Australian supplies increase from their presently reduced levels, prices will fall and relatively low producer and consumer prices will prevail in Argentina.

Projection set III produces a path of production, consumption, and exports which fit fairly closely the levels projected initially in this chapter using the restrictive assumptions of a continuance of 1970 beef prices, with a 15-percent reduction in grain prices.

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Appendix table 1.--Argentina's exports and imports of foods, beverages, and agricultural raw materials, 1960-69

SITC code 1/	Commodity group	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
-Million dollars-											
EXPORTS											
Food and live animals											
00	Live animals	21.1	24.0	27.8	32.9	24.5	23.9	25.9	42.0	34.9	n.a.
01	Meat and meat preparations	221.5	246.0	227.0	332.7	326.5	326.6	395.0	381.0	334.2	434.9
02	Dairy products and eggs	33.6	21.2	13.9	17.0	13.5	12.4	10.6	7.4	4.4	n.a.
04	Cereals and cereal preparations	319.2	187.8	351.0	281.3	503.4	581.6	547.5	401.8	346.0	n.a.
05	Fruits and vegetables	34.0	27.2	38.7	58.3	42.2	51.3	54.6	67.6	72.9	n.a.
06	Sugar, sugar prep., and honey	6.7	12.7	9.2	67.7	12.3	12.3	9.8	13.1	18.1	n.a.
07	Coffee, cocoa, tea, and spices	2.6	4.0	3.8	4.7	5.8	8.5	8.6	6.5	9.5	8.3
08	Animal feed	73.7	74.2	93.0	100.5	94.0	104.1	97.6	102.6	97.0	n.a.
09	Misc. food preparations	2.4	3.1	3.4	3.3	1.2	1.8	3.8	2.9	3.7	n.a.
Beverages											
11	Alcoholic and nonalcoholic	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.5	n.a.
Agricultural raw materials											
121	Tobacco, unmanufactured	.9	1.2	4.0	5.9	5.0	5.3	4.3	4.7	5.6	5.9
21	Hides and skins, undressed	72.4	82.1	92.7	78.0	55.2	48.5	77.0	68.7	57.2	n.a.
22	Oilseeds	7.8	11.9	2.1	2.8	.1	.1	.1	.1	--	--
231.1	Natural rubber	. . . . .	--	--	--	--	--	--	--	--	--
261-265	Natural fibers	149.7	155.6	164.2	162.0	112.8	108.2	126.0	101.7	100.8	174.4
29	Crude materials, n.e.s. 2/	13.8	10.5	14.7	13.6	11.2	12.7	17.7	18.2	14.0	n.a.
4	Animal and vegetable oils and fats	87.6	78.0	102.8	76.6	60.3	88.8	82.6	94.5	67.1	n.a.
Total agricultural exports											
	Other exports	1,047.1	999.6	1,146.4	1,237.5	1,268.3	1,386.4	1,461.4	1,313.1	1,165.9	n.a.
	Total exports	32.1	24.5	69.6	127.6	142.1	107.0	131.8	151.4	202.0	n.a.
	Agricultural percent of total	1,079.2	964.1	1,216.0	1,365.1	1,410.4	1,493.4	1,593.2	1,464.5	1,367.9	1,612.1
		97.0	97.5	94.3	90.6	89.9	92.8	91.7	89.7	85.2	n.a.
IMPORTS											
Food and live animals											
00	Live animals	2.3	2.4	1.1	.7	2.7	5.0	2.6	1.0	1.8	n.a.
01	Meat and meat preparations	--	--	--	--	--	--	.1	--	--	--
02	Dairy products and eggs	--	1.1	.1	--	.9	1.8	.6	.5	2.1	n.a.
04	Cereals and cereal preparations	.2	.1	.4	--	.1	.3	.8	12.5	.8	n.a.
05	Fruits and vegetables	7.5	8.9	14.0	8.5	15.6	19.4	17.3	13.8	15.0	n.a.
06	Sugar, sugar prep., and honey	.1	.4	.2	.2	.4	.3	.3	.4	.3	n.a.
07	Coffee, cocoa, tea, and spices	28.5	32.1	26.8	25.7	37.0	36.3	41.1	33.2	30.2	n.a.
08	Animal feed	--	--	--	--	--	--	1.5	.2	1.0	n.a.
09	Misc. food preparations	.1	.1	.1	.1	.2	.5	1.3	1.8	1.7	n.a.
Beverages											
11	Alcoholic and nonalcoholic	1.9	3.1	3.9	2.3	2.8	2.9	4.1	4.3	4.6	n.a.
Agricultural raw materials											
121	Tobacco, unmanufactured	1.1	.6	.2	.2	.1	.1	.6	.7	1.1	n.a.
21	Hides and skins, undressed	.1	.1	.1	--	.1	.4	.3	.3	.5	n.a.
22	Oilseeds	. . . . .	--	--	--	--	--	.2	.2	.3	n.a.
231.1	Natural rubber	18.6	20.7	13.3	10.4	15.4	14.4	12.9	10.6	9.9	12.0
261-265	Natural fibers	7.6	9.0	9.4	6.3	13.7	20.7	15.0	10.0	14.1	11.5
29	Crude materials, n.e.s. 2/	5.9	7.1	4.1	3.7	5.4	6.1	7.2	5.9	5.4	n.a.
4	Animal and vegetable oils and fats	.8	1.0	.8	.9	1.2	1.8	1.2	1.4	.6	n.a.
Total agricultural imports											
	Other imports	74.7	85.7	74.5	59.0	95.6	110.0	107.1	96.8	89.4	n.a.
	Total imports	1,174.6	1,374.7	1,282.0	921.7	981.6	1,088.6	1,017.2	998.7	1,079.8	n.a.
	Agricultural percent of total	1,249.3	1,460.4	1,356.5	960.7	1,077.2	1,198.6	1,124.3	1,095.5	1,169.2	1,576.1
		6.0	5.9	5.5	6.0	8.9	9.2	9.5	8.8	7.6	n.a.

-- means Negligible. 1/ Standard Industrial Trade Classification. 2/ Mainly caseln. Sources: (27 and 32).

Appendix table 2.--Value and quantity of Argentina's exports of major cereals and selected cereal products, 1964-69

Commodity	1964	1965	1966	1967	1968	1969
	<u>-Million dollars-</u>					
Grains and preparations	503.4	580.5	547.4	401.8	346.0	427.2
Wheat and flour. . .	243.4	372.7	281.0	122.3	140.2	143.9
Barley, unmilled . .	25.5	15.0	6.5	4.0	10.0	9.5
Oats, unmilled . . .	20.0	15.0	5.3	8.6	13.0	5.1
Rye, unmilled. . . .	6.0	4.0	.2	.2	.9	.6
Corn, unmilled . . .	168.1	153.6	200.7	223.5	139.8	194.6
Other cereals, unmilled.	35.5	14.6	45.9	34.6	31.8	68.8
Malt, incl. flour. .	3.6	1.6	1.7	2.2	1.7	1.4
Bran, pollards, sharps, etc. . . .	26.2	26.4	26.0	28.6	31.8	30.5
Total.	529.6	606.9	573.4	430.4	377.8	457.7
	<u>1,000 metric tons-</u>					
Grains and preparations	9,090	10,598	10,265	7,458	6,619	8,384
Wheat and flour. . .	3,724	6,661	5,071	2,063	2,434	2,429
Barley, unmilled . .	520	300	114	65	182	208
Oats, unmilled . . .	467	349	111	197	317	128
Rye, unmilled. . . .	112	96	5	3	19	13
Corn, unmilled . . .	3,339	2,802	3,752	4,318	2,893	4,024
Other cereals, unmilled.	880	330	1,137	744	691	1,623
Bran, pollards, sharps, etc. . . .	721	585	622	675	712	745
Malt, incl. flour	32	11	12	15	12	10

Source: (74).

Appendix table 3.--Value of Argentina's exports of animals and major animal products, 1964-69

Commodity	1964	1965	1966	1967	1968	1969
	<u>Million dollars</u>					
Live animals.	24.5	23.6	25.9	42.0	34.9	32.7
Cattle.	23.1	22.8	24.8	39.6	31.3	30.8
Sheep, lambs, and goats . . . .	.2	.1	.5	.7	1.2	.4
Other	1.2	.7	.6	1.7	2.4	1.5
Meat, incl. poultry	326.5	328.7	395.0	381.0	334.2	434.9
Meat, fresh, chilled, frozen :	266.1	270.5	307.6	269.3	204.9	301.3
Cattle, f.c.f.	224.3	230.6	241.9	202.8	149.9	235.4
Mutton, f.c.f.	7.4	11.8	18.4	20.6	13.2	15.2
Horse, f.c.f.	19.7	14.1	21.8	22.6	25.6	27.2
Edible offal, f.c.f.	11.2	12.3	16.8	17.8	14.1	19.6
Other meat, f.c.f.	3.5	1.7	8.7	5.5	2.1	3.9
Meat, dried, salted, smoked . . .	2.1	2.6	2.0	2.6	1.6	1.7
Meat extracts and juices.	15.0	10.0	20.7	20.0	16.4	15.9
Meat prepared and preserved . . .	43.1	45.6	64.5	88.9	111.1	115.9
Hides and skins, undressed. . . .	54.0	45.8	75.1	67.6	56.1	67.8
Cattle hides.	40.4	35.6	60.3	57.8	43.5	55.7
Goat and kid skin . . . . .	.9	.4	.5	.5	.8	1.0
Sheep skin, common with wool :	10.1	9.4	11.5	6.7	8.3	7.0
Wool, greasy, fleece washed . . .	90.3	102.4	87.3	62.3	62.8	52.7
Crude animal matter	9.3	4.7	13.9	13.3	10.3	10.4
Animal oils and fats.	4.5	7.1	10.7	12.9	8.0	21.0
Total.	509.1	512.3	607.9	579.1	506.3	619.5
	<u>-1,000 metric tons-</u>					
Meat, incl. poultry	607	529	637	654	528	712
Meat, fresh, chilled, frozen :	544	470	560	546	406	578
Cattle, f.c.f.	421	352	401	380	255	405
Meat, dried, salted, smoked	4	4	3	4	3	3
Meat extracts and juices	5	1	5	6	4	5
Meat, prepared and preserved. . .	54	55	69	97	114	126

Source: (74).

Appendix table 4.--Agronomic and economic factors by size of operations in 2 areas of Argentina

Farm characteristics	County of 25 de Mayo (1965)										Pergamino area (1966)									
	Small		Medium		Large		Small		Medium		Small		Medium		Large		Small		Medium	
	100-199 hectares	1,000 pesos	200-499 hectares	1,000 pesos	Over 500 hectares	1,000 pesos	60-130 hectares	1,000 pesos	131-400 hectares	1,000 pesos	60-130 hectares	1,000 pesos	131-400 hectares	1,000 pesos	Over 400 hectares	1,000 pesos	60-130 hectares	1,000 pesos	131-400 hectares	1,000 pesos
Capital structure																				
Capital - total	11,586.4	100.0	21,308.9	100.0	65,818.3	100.0	21,866.9	100.0	68,507.6	100.0	21,866.9	100.0	68,507.6	100.0	123,880.2	100.0	21,866.9	100.0	68,507.6	100.0
Capital - fixed 1/	7,891.5	68.0	15,483.7	72.6	49,798.8	75.6	16,094.0	73.6	54,943.1	80.2	16,094.0	73.6	54,943.1	80.2	102,572.8	82.8	16,094.0	73.6	54,943.1	80.2
Capital - working fixed 2/	2,714.0	23.4	4,086.9	19.1	11,429.4	17.4	4,285.9	19.6	12,264.1	9.9	4,285.9	19.6	12,264.1	9.9	12,264.1	9.9	4,285.9	19.6	12,264.1	9.9
Capital - working 3/	980.8	8.6	1,738.3	8.3	4,590.1	7.0	1,486.9	6.8	5,343.6	7.8	1,486.9	6.8	5,343.6	7.8	9,043.3	7.3	1,486.9	6.8	5,343.6	7.8
Capital - total working 4/	3,694.8	0	5,825.2	0	16,019.5	0	5,772.8	0	13,564.5	0	5,772.8	0	13,564.5	0	21,307.4	0	5,772.8	0	13,564.5	0
Land use																				
Area - total	148.0	100.0	316.2	100.0	959.3	100.0	84.0	100.0	273.0	100.0	84.0	100.0	273.0	100.0	542.0	100.0	84.0	100.0	273.0	100.0
Area - grains	75.6	51.1	119.5	37.8	243.5	25.4	49.0	59.0	145.0	53.0	49.0	59.0	145.0	53.0	178.0	33.0	49.0	59.0	145.0	53.0
Corn	14.9		25.7		45.9		20.6		52.2		20.6		52.2		119.3		20.6		52.2	
Wheat	38.4		58.9		131.2		19.1		76.8		19.1		76.8		40.9		19.1		76.8	
Sunflower	15.4		29.2		42.2		9.3		14.5		9.3		14.5		16.0		9.3		14.5	
Grain sorghum	3.2		1.2		8.8		--		1.5		--		1.5		1.8		1.5		1.8	
Area - pasture	69.1	46.7	182.4	57.7	660.2	68.8	32.0	38.1	123.0	45.1	32.0	38.1	123.0	45.1	357.0	65.9	32.0	38.1	123.0	45.1
Natural pasture	31.4		110.9		408.6		4.5		29.5		4.5		29.5		75.0		4.5		29.5	
Forage grain	19.6	13.2	35.0	11.1	109.8	11.4	16.0	19.0	39.4	14.4	16.0	19.0	39.4	14.4	85.7	15.8	16.0	19.0	39.4	14.4
Other pasture	18.1		36.5		141.8		11.5		54.1		11.5		54.1		196.3		11.5		54.1	
Yields																				
Corn	2,108		1,859		2,200		3,400		3,500		3,400		3,500		3,900		3,400		3,500	
Wheat	1,653		1,589		1,738		1,800		2,000		1,800		2,000		2,300		1,800		2,000	
Sunflower	894		999		934		1,200		900		1,200		900		1,200		1,200		900	
Grain sorghum	4,200		2,500		3,026		--		2,500		--		2,500		2,400		--		2,500	
Labor 5/	1.8		2.6		4.6		6.6		11.6		6.6		11.6		14.9		6.6		11.6	
Total	94.3		196.9		687.6		72.0		260.0		72.0		260.0		535.0		72.0		260.0	
Animals	1.36		1.08		1.04		2.25		2.11		2.25		2.11		1.50		2.25		2.11	
Per farm	94.3		196.9		687.6		72.0		260.0		72.0		260.0		535.0		72.0		260.0	
Per area (pasture)	1.36		1.08		1.04		2.25		2.11		2.25		2.11		1.50		2.25		2.11	
Income																				
Income minus cost of production	912,714		1,535,329		4,152,852		1,158,689		3,603,570		1,158,689		3,603,570		6,551,843		1,158,689		3,603,570	
Income net of depreciation	697,279		1,077,108		3,448,266		602,848		2,347,810		602,848		2,347,810		5,330,760		602,848		2,347,810	
Income minus cost of production/ha.	6,167		4,856		4,329		13,794		13,200		13,794		13,200		12,088		13,794		13,200	
Economic indicators																				
Return to capital - total 6/	1,000		1,000		1,000		1,000		1,000		1,000		1,000		1,000		1,000		1,000	
Return to capital - total working 6/	78.3		67.4		68.6		260.3		250.9		260.3		250.9		228.6		260.3		250.9	
Capital, total/ha.	24.9		18.4		16.7		68.7		49.7		68.7		49.7		39.4		68.7		49.7	
Capital, total working/ha.	6,436.9		8,195.7		14,308.3		3,313.2		5,905.8		3,313.2		5,905.8		8,314.1		3,313.2		5,905.8	
Capital, total working/labor 7/	2,032.7		2,240.5		3,482.5		874.7		1,169.4		874.7		1,169.4		1,430.0		874.7		1,169.4	
Capital, working fixed/labor 7/	1,507.8		1,571.9		2,484.7		649.4		708.7		649.4		708.7		823.1		649.4		708.7	

1/ Fixed capital = land, buildings, and improvements on both. 2/ Working fixed capital = machinery and equipment. 3/ Working capital = capital for immediate production needs such as seeds, herbicide and labor. 4/ Total working capital = machinery and working capital. 5/ Man-year = 300 days at 10 hours per day. 6/ Figures represent rates of return to capital. 7/ Figures represent capital per unit of labor.

Sources: (49 and 3).

Appendix table 5.--Land utilization in Argentina by major agricultural regions, 1961/62

Region and Province	Crop land	Vineyards and orchards	Meadows and permanent grassland	Woods and forests	Rough grazing land	Non- agricultural land	Total
-----1,000 hectares-----							
<u>Pampa</u>	<u>16,618</u>	<u>331</u>	<u>8,683</u>	<u>10,550</u>	<u>33,397</u>	<u>13,328</u>	<u>82,908</u>
Buenos Aires	7,906	189	3,520	150	14,607	4,382	30,756
Entre Ríos	947	83	176	1,200	3,322	1,892	7,621
Santa Fe	2,463	26	2,105	1,500	4,267	2,938	13,300
Cordoba	3,759	30	2,370	2,200	6,489	2,035	16,885
La Pampa	1,543	1	511	5,500	4,710	2,078	1,542
<u>Northeast</u>	<u>393</u>	<u>77</u>	<u>--</u>	<u>4,100</u>	<u>4,703</u>	<u>2,639</u>	<u>11,915</u>
Misiones	205	29	--	2,300	196	249	2,980
Corrientes	189	48	--	1,800	4,508	2,390	8,935
<u>North</u>	<u>630</u>	<u>5</u>	<u>43</u>	<u>12,500</u>	<u>306</u>	<u>3,684</u>	<u>17,169</u>
Formosa	83	1	--	5,000	129	1,991	7,206
Chaco	547	3	42	7,500	176	1,693	9,963
<u>Northwest</u>	<u>633</u>	<u>66</u>	<u>178</u>	<u>27,350</u>	<u>21,020</u>	<u>6,543</u>	<u>55,792</u>
<u>Cuyo</u>	<u>295</u>	<u>328</u>	<u>166</u>	<u>4,300</u>	<u>18,213</u>	<u>8,068</u>	<u>31,372</u>
<u>Patagonia</u>	<u>27</u>	<u>64</u>	<u>47</u>	<u>5,200</u>	<u>58,100</u>	<u>15,224</u>	<u>78,664</u>
Total 1/	18,597	875	9,120	64,000	135,741	49,489	277,823
-----Percent-----							
<u>Pampa</u>	<u>89.3</u>	<u>37.9</u>	<u>95.2</u>	<u>16.5</u>	<u>24.6</u>	<u>26.9</u>	<u>29.8</u>
Buenos Aires	42.5	21.7	38.6	1.2	10.8	8.9	11.2
Entre Ríos	5.1	9.5	1.9	1.9	2.4	3.8	2.7
Santa Fe	13.2	3.1	23.1	2.3	3.1	5.9	4.7
Cordoba	20.2	3.5	26.0	3.4	4.8	4.1	6.0
La Pampa	8.3	.1	5.6	8.7	3.5	4.2	5.2
<u>Northeast</u>	<u>2.1</u>	<u>8.0</u>	<u>--</u>	<u>6.4</u>	<u>3.5</u>	<u>5.3</u>	<u>4.4</u>
Misiones	1.1	3.4	--	3.6	.1	.5	1.1
Corrientes	1.0	5.5	--	2.8	3.4	4.8	3.3
<u>North</u>	<u>3.4</u>	<u>.6</u>	<u>.5</u>	<u>19.5</u>	<u>.2</u>	<u>7.4</u>	<u>6.1</u>
Formosa	.4	.2	--	7.8	.1	4.0	2.6
Chaco	3.0	.4	.5	11.7	.1	3.4	3.5
<u>Northwest 2/</u>	<u>3.4</u>	<u>7.6</u>	<u>2.0</u>	<u>42.8</u>	<u>15.5</u>	<u>13.3</u>	<u>20.1</u>
<u>Cuyo 3/</u>	<u>1.6</u>	<u>37.6</u>	<u>1.8</u>	<u>6.7</u>	<u>13.4</u>	<u>16.3</u>	<u>11.3</u>
<u>Patagonia 4/</u>	<u>.2</u>	<u>7.4</u>	<u>.5</u>	<u>8.1</u>	<u>42.8</u>	<u>30.8</u>	<u>28.3</u>
Total 1/	100.0	100.0	100.0	100.0	100.0	100.0	100.0

-- means less than 500 hectares or .05 percent. 1/ May not add due to rounding. 2/ Provinces of Jujuy, Salta, Catamarca, Tucumán, Santiago del Estero, and La Rioja. 3/ San Juan, San Luis, and Mendoza. 4/ Neuquén, Río Negro, Chubut, Santa Cruz, and Tierra del Fuego.

Source: (13).

Appendix table 6.--Area planted to selected crops in Argentina and their share of total planted area, 1950/51-1969/70

Year	Grains planted 1/	Oilseeds 2/	Fruits and vegetables 3/	Industrial crops 4/	Forages 5/	Total 6/	Grains harvested	Grains not harvested	Forages plus grains not harvested
-----Million hectares-----									
Averages									
1950/51-1954/55	14.0	2.0	0.9	1.1	8.1	26.1	10.3	3.7	11.8
1955/56-1959/60	15.0	2.8	1.0	1.2	8.5	28.5	11.0	4.0	12.5
1960/61-1964/65	15.2	2.7	1.1	1.2	7.9	28.1	10.4	4.8	12.7
1965/66-1969/70	17.8	2.5	1.1	0.9	7.1	29.5	12.3	5.6	12.7
Annual									
1960/61	14.3	2.5	1.1	1.2	8.3	27.4	9.5	4.8	13.1
1961/62	15.0	2.9	1.0	1.2	8.4	28.5	10.2	4.7	13.1
1962/63	14.4	2.8	1.1	1.1	7.7	27.1	8.4	6.0	13.8
1963/64	16.3	2.6	1.1	1.2	7.8	29.0	11.8	4.5	12.2
1964/65	15.9	2.7	1.1	1.2	7.4	28.4	12.0	3.9	11.3
1965/66	15.2	2.8	1.1	1.0	7.2	27.4	9.9	5.3	12.5
1966/67*	16.1	2.6	7/ 1.1	0.8	7.1	27.7	10.5	5.6	12.7
1967/68*	17.7	2.2	7/ 1.1	0.8	7.1	28.9	12.3	5.4	12.5
1968/69*	18.7	2.5	7/ 1.2	0.9	7.4	30.6	12.8	5.9	13.3
1969/70*	18.5	2.6	7/ 1.1	1.1	6.7	29.9	12.9	5.6	12.3
-----Percent of total 8/-----									
Averages									
1950/51-1954/55	53.6	7.8	3.6	4.1	30.8	100.0	39.5	14.1	45.0
1955/56-1959/60	52.6	9.7	3.6	4.2	29.8	100.0	38.6	14.0	43.8
1960/61-1964/65	54.1	9.6	3.9	4.2	28.2	100.0	37.0	17.1	45.2
1965/66-1969/70	60.4	8.6	3.8	3.1	24.1	100.0	41.5	18.9	43.0
Annual									
1960/61	52.2	9.0	4.1	4.4	30.3	100.0	34.8	17.4	47.8
1961/62	52.5	10.3	3.6	4.1	29.5	100.0	35.9	16.6	46.1
1962/63	53.1	10.2	3.9	4.2	28.6	100.0	30.9	22.2	50.8
1963/64	56.2	9.1	3.8	4.1	26.8	100.0	40.7	15.5	42.2
1964/65	56.1	9.6	4.1	4.3	25.9	100.0	42.3	13.8	39.7
1965/66	55.4	10.3	4.1	3.8	26.4	100.0	36.1	19.3	45.7
1966/67*	58.1	9.5	3.9	3.0	25.5	100.0	38.1	20.1	45.7
1967/68*	61.2	7.6	4.0	2.6	24.6	100.0	42.4	18.8	43.4
1968/69*	61.0	8.1	3.8	2.9	24.2	100.0	41.7	19.4	43.6
1969/70*	61.8	8.5	3.8	3.6	22.3	100.0	42.9	18.8	41.2

*Provisional

1/ Wheat, oats, barley, rye, corn, sorghum grain, rice millet, and canary seed. Sorghum grain included since 1952/53.
 2/ Linseed, sunflower, and peanuts. 3/ Garlic, dry peas, green peas, sweetpotatoes, onions, berries, chickpeas, lentils, potatoes, French beans, chile and pimiento, artichoke, celery, asparagus, dry and green beans, tomatoes, squash, melons, water-melons, and other vegetables. Cherries, plums, peaches, apples, quince, pears, lemons, tangerines, oranges, grapefruit, olives, grapes and other fruits. 4/ Cotton, sugarcane, hemp, flax, manioc, rapeseed, tobacco, castorbeans, tung, yerba mate, anise, cumin seed, lavender, hops, mints, osier, soybeans, tea, sugarbeets, and other crops. 5/ Alfalfa, sweet sorghum, sudan grass, and other forages. 6/ Numbers differ from those in table 7, which are census data and are net of multiple cropping. They appear to include forages under the category of meadows and permanent grasslands. 7/ Includes arbitrary estimate by authors of 650,000 for fruits (1966/67-1969/70) to provide a total approximately equivalent to earlier years. 8/ Computed from unrounded data; therefore, items may not total exactly 100.

Source: (2), 1969 issue.

Appendix table 7.--Wheat, corn, and grain sorghum supply and distribution in Argentina, 5-year averages 1945/46-1969/70 and annual 1965/66-1970/71

Production season 1/	Area		Percent harvested	Yield 2/ Kilograms/ hectare	Produc- tion	Carry- in 3/	Imports	Total supply	Exports 3/	Percent of pro- duction exported	Apparent consumption		Carry- out 3/
	Planted	Harvested									Total	Per capita (total)	
	-1,000 hectares-		Percent				-1,000 metric tons-			Percent	1,000 metric tons	Kilograms	1,000 metric tons
Wheat													
1945/46-1949/50	5,877	4,627	79	1,096	5,073	n.a.	--	5,073	2,010	40	3,063	187	n.a.
1950/51-1954/55	5,940	4,804	81	1,225	5,884	930	42	6,855	2,296	33	3,310	182	1,249
1955/56-1959/60	5,394	4,694	87	1,309	6,143	1,563	--	7,651	2,473	32	3,868	194	1,360
1960/61-1964/65	5,369	4,720	88	1,518	7,165	983	--	8,148	3,111	38	3,624	167	1,413
1965/66-1969/70	6,309	5,331	84	1,216	6,481	1,152	112	7,745	2,950	38	4,080	174	764
1965/66	5,724	4,601	80	1,321	6,079	3,340	--	9,419	5,539	91	3,705	163	175
1966/67	6,291	5,214	83	1,198	6,247	175	133	6,555	2,202	35	4,108	178	245
1967/68	6,613	5,812	83	1,260	7,320	245	35	7,600	2,262	31	4,330	185	1,250
1968/69	6,680	5,837	87	983	7,740	1,250	390	7,380	2,461	42	4,169	176	750
1969/70 5/	6,239	5,191	83	1,352	7,020	750	--	7,770	2,284	33	4,086	170	1,400
1970/71 5/	4,201	3,332	79	1,276	4,250	1,400	--	5,650	700	16	4,050	166	900
Corn													
1945/46-1949/50 6/	3,394	2,459	72	1,834	4,510	n.a.	--	4,510	2,056	46	2,454	150	n.a.
1950/51-1954/55	2,919	2,056	70	1,484	3,051	135	--	3,187	916	29	2,123	117	147
1955/56-1959/60	2,889	2,284	79	1,788	4,083	160	--	4,242	1,778	42	2,130	117	135
1960/61-1964/65	3,483	2,836	81	1,757	4,984	30	--	5,014	2,689	54	2,290	106	30
1965/66-1969/70	4,362	3,535	81	2,140	7,564	18	--	7,582	4,202	55	3,367	144	16
1965/66	3,921	3,275	84	2,150	7,040	25	--	7,065	4,022	57	3,029	133	14
1966/67	4,156	3,450	83	2,466	8,000	14	--	8,014	4,128	52	3,853	167	33
1967/68	4,473	3,378	76	1,942	6,560	33	--	6,593	3,442	52	3,151	135	12
1968/69	4,595	3,556	77	1,929	6,860	12	--	6,872	3,953	58	2,907	123	12
1969/70 5/	4,666	4,017	86	2,330	9,360	8	--	9,368	5,464	58	3,896	162	8
1970/71 5/	4,965	4,118	83	2,404	9,900	n.a.	--	9,900	6,000	61	3,900	160	n.a.
Grain sorghum													
1951/52-1954/55	58	23	40	1,391	32	n.a.	--	32	2	6	30	2	n.a.
1955/56-1959/60	430	232	54	1,849	429	n.a.	--	433	79	18	353	174	n.a.
1960/61-1964/65	1,110	617	56	1,854	1,144	13	--	1,157	410	35	733	34	14
1965/66-1969/70	1,872	1,171	63	2,000	2,342	9	--	2,352	1,097	47	1,168	50	7
1965/66	1,346	836	62	2,549	2,130	13	--	2,143	1,085	51	1,045	46	13
1966/67	1,454	764	53	1,805	1,380	13	--	1,393	422	31	962	42	9
1967/68	1,841	1,083	59	1,752	1,897	9	--	1,906	811	43	1,086	46	9
1968/69	2,151	1,302	61	1,908	2,484	9	--	2,493	1,463	59	1,027	43	3
1969/70 5/	2,569	1,872	73	2,041	3,820	3	--	3,823	1,703	44	1,720	72	n.a.
1970/71 5/	3,122	2,235	72	2,085	4,660	n.a.	--	4,660	2,500	54	1,760	72	400

-- means Negligible

1/ Wheat is generally planted May through Sept. and harvested Nov. through Jan. Corn is usually planted July through Nov. and harvested Jan. through July, with the bulk of the harvest occurring after Mar. Grain sorghum is mainly planted Oct. through Dec. and harvested mainly Mar. through June. Therefore, wheat, corn, and grain sorghum are planted in first of split year shown and primarily harvested, marketed, and consumed in second year shown. 2/ Yield per harvested hectare. 3/ Carry-in and exports for year beginning Dec. 1 of first year shown for wheat; Apr. 1 of second year shown for corn and grain sorghum. Carry-out as of Nov. 30 for wheat; Mar. 30 for corn and grain sorghum. Carry-over is in licensed facilities as reported by the National Grain Board; farm stocks are not included. 4/ Residual. 5/ Provisional. 6/ 4-year average because unusually poor weather conditions in 1949/50 reduced harvested area to 942,000 hectares on 2,156,000 hectares planted and resulted in very low yields and production.

Sources: (40, No. 75, Sept. 1969) for years through 1967/68; for later years, (28).

Appendix table 8.--Barley, oats, and rye supply and distribution in Argentina, 5-year averages 1945/46-1969/70 and annual 1965/66-1970/71

Production season 1/	Area		Yield 2/ Kg./ha.	Production	Carry-in 3/ 1,000 metric tons	Exports for		Percent		1,000 metric tons		Apparent consumption		Carry-out 3/ 1,000 metric tons
	Planted	Harvested				year begin- ning Dec. 1	of pro- duction	of pro- duction	of pro- duction	Total	exported	Total	Per capita	
	-1,000 hectares-	Percent	Percent	-	-	-	-	-	-	metric tons	Percent	metric tons	Kilograms	metric tons
Barley														
1945/46-1949/50	1,042	656	63	764	n.a.	764	478	63	288	18	288	18	n.a.	n.a.
1950/51-1954/55	1,011	642	64	856	114	970	379	39	425	23	425	23	166	166
1955/56-1959/60	1,344	895	67	1,098	118	1,216	437	36	695	35	695	35	84	84
1960/61-1964/65	1,103	614	56	753	64	817	239	29	534	25	534	25	44	44
1965/66-1969/70	933	458	49	511	21	532	135	25	379	16	379	16	18	18
1965/66	909	384	42	1,053	29	443	116	29	313	14	313	14	4	4
1966/67	919	411	42	1,066	4	442	55	13	373	16	373	16	14	14
1967/68	882	496	56	588	14	602	172	29	386	16	386	16	44	44
1968/69	1,011	539	53	556	40	596	239	43	341	14	341	14	16	16
1969/70	945	458	48	570	16	586	93	16	480	20	480	20	13	13
1970/71	813	356	44	367	13	380	60	16	310	13	310	13	10	10
Oats														
1945/46-1949/50	1,445	657	45	716	n.a.	716	154	22	562	34	562	34	n.a.	n.a.
1950/51-1954/55	1,416	687	48	864	150	1,019	234	23	627	34	627	34	154	154
1955/56-1959/60	1,736	816	47	1,149	115	1,053	326	31	604	30	604	30	123	123
1960/61-1964/65	1,331	608	46	748	133	881	302	34	466	22	466	22	112	112
1965/66-1969/70	1,176	424	36	525	29	554	202	36	329	14	329	14	23	23
1965/66	1,117	421	38	480	46	526	119	25	396	17	396	17	11	11
1966/67	1,143	412	36	540	11	551	157	29	365	16	365	16	29	29
1967/68	1,193	516	43	690	29	719	346	50	337	14	337	14	36	36
1968/69	1,299	443	34	490	36	526	163	33	342	14	342	14	16	16
1969/70	1,129	327	29	425	21	446	224	53	206	9	206	9	16	16
1970/71	1,026	300	29	360	16	376	150	42	216	9	216	9	10	10
Rye														
1945/46-1949/50	1,782	649	36	380	n.a.	380	180	47	200	12	200	12	n.a.	n.a.
1950/51-1954/55	2,321	899	39	699	213	913	361	40	319	17	319	17	233	233
1955/56-1959/60	2,796	1,077	38	808	88	896	175	20	646	32	646	32	76	76
1960/61-1964/65	2,414	629	26	474	31	505	52	10	428	20	428	20	8	8
1965/66-1969/70	2,339	490	21	321	13	333	15	4	310	13	310	13	8	8
1965/66	2,136	331	15	245	37	282	12	5	262	12	262	12	8	8
1966/67	2,285	420	18	270	8	278	--	--	273	12	273	12	5	5
1967/68	2,285	565	25	352	5	257	23	6	323	14	323	14	11	11
1968/69	2,500	604	24	369	11	371	13	4	356	15	356	15	2	2
1969/70	2,489	528	21	377	2	379	27	7	336	14	336	14	16	16
1970/71	1,971	242	12	121	16	137	1	1	136	6	136	6	n.a.	n.a.

-- means Negligible.

1/ Barley is planted May through Sept.; oats is planted May through Aug.; rye is planted Apr. through Aug.; all 3 grains are harvested Nov. through Jan. Therefore, all 3 grains are planted in the first of split year shown and primarily harvested, marketed, and consumed in the second year shown. 2/ Yield per harvested hectare. 3/ Carry-in Dec. 1 of first year; carry-out Nov. 30 of second year shown. Carry-over in licensed facilities as reported by the National Grain Board; farm stocks are not included. 4/ Residual. 5/ Provisional.

Sources: (40), No. 75, Sept. 1969 for years through 1967/68; for later years, (28).

Appendix table 9.--Beef, mutton, and lamb and pork supply and distribution in Argentina, 5-year averages 1946-70 and annual beef data 1961-70

Year	Number 1/	Slaughter :	Slaughter rate	Carcass weight per animal	Meat production (carcass weight)	Exports 2/ :	Percent of production exported	Apparent consumption	
								Total	Per capita
	Million head	1,000 head	Percent	Kilograms	- - 1,000 metric tons-	Percent	1,000 metric tons	Kilograms	
Beef									
1946-50	3/ 41.0	9,181	n.a.	212	1,942	491	25	1,451	88.8
1951-55	4/ 43.6	8,759	20	215	1,879	282	15	1,597	87.8
1956-60	43.4	10,778	25	210	2,263	547	24	1,715	86.2
1961-65	4/ 43.1	10,686	26	210	2,229	552	25	1,677	77.5
1966-70	49.6	12,607	25	205	2,579	661	26	1,918	82.0
1961.	42.5	10,212	24	210	2,145	396	18	1,749	83.3
1962.	42.9	11,791	28	203	2,379	545	23	1,834	85.9
1963.	40.3	12,927	32	202	2,605	732	28	1,874	86.4
1964.	40.3	9,368	n.a.	216	2,019	585	29	1,435	65.2
1965.	46.7	9,134	19	218	1,995	502	25	1,493	66.8
1966.	48.4	11,076	23	210	2,321	586	25	1,735	76.5
1967.	51.2	12,821	24	201	2,522	697	28	1,825	79.2
1968.	51.5	12,802	25	200	2,561	607	24	1,954	83.6
1969 5/	6/ 48.3	13,821	29	209	2,883	768	27	2,115	89.2
1970 5/	48.4	12,815	26	204	2,610	648	25	1,962	81.6
Mutton and lamb									
1946-50	3/ 51.2	13,129	n.a.	19	248	116	47	132	8.1
1951-55	48.7	9,968	n.a.	19	189	64	33	124	6.8
1956-60	47.3	9,460	n.a.	18	171	48	28	123	6.2
1961-65	n.a.	8,842	n.a.	18	156	35	22	121	5.6
1966-70	n.a.	10,902	n.a.	18	193	60	31	133	5.6
Pork									
1946-50	3/ 2.9	2,198	n.a.	76	164	37	23	128	7.8
1951-55	3.6	1,893	n.a.	78	148	18	12	131	7.1
1956-60	3.6	2,321	n.a.	81	186	26	14	160	8.0
1961-65	n.a.	2,173	n.a.	80	174	9	5	165	7.6
1966-70	n.a.	2,623	n.a.	80	210	9	4	199	8.5

1/ June 30. 2/ Carcass weight equivalent. 3/ 1947 only. 4/ 4-year average. 5/ Provisional. 6/ Census.

Sources: (32) for period 1946 to 1966; for later years, (37, 1970).

Appendix table 10.--Grain production, livestock numbers, and area planted by Province as a percent of Argentine total, 1960/61-1969/70

Commodity and year	Buenos Aires	Entre Rios	Santa Fe	Cordoba	La Pampa	Total Pampa	Chaco	San Luis	Total other Provinces	Total country
						Percent				
<u>Wheat production</u>										
1960/61-1964/65	57.4	4.4	15.9	15.0	6.7	99.4	1/	1/	0.6	100.0
1965/66-1969/70	66.1	4.2	11.1	10.0	7.3	98.7	1/	1/	1.2	100.0
<u>Wheat area planted</u>										
1960/61-1964/65	50.9	5.4	14.6	17.8	10.3	99.1	1/	1/	0.9	100.0
1965/66-1969/70	55.2	5.8	11.5	13.7	11.9	98.2	1/	1/	1.8	100.0
<u>Corn production</u>										
1960/61-1964/65	29.8	5.8	30.9	22.6	.4	89.5	2.0	3.1	10.5	100.0
1965/66-1969/70	35.6	7.6	29.5	19.2	.4	92.3	.8	2.6	7.7	100.0
<u>Corn area planted</u>										
1960/61-1964/65	25.6	10.3	23.0	21.1	2.2	82.4	3.2	5.8	17.6	100.0
1965/66-1969/70	25.6	11.9	20.3	22.0	4.2	84.0	1.6	5.7	16.0	100.0
<u>Grain sorghum production</u>										
1960/61-1964/65	21.8	1.4	44.0	26.8	1.0	95.0	2.5	1.0	5.0	100.0
1965/66-1969/70	18.1	8.2	28.2	29.8	3.8	88.1	8.7	.4	11.9	100.0
<u>Grain sorghum area planted</u>										
1960/61-1964/65	26.2	3.7	33.9	28.6	3.7	95.9	1.5	1.1	4.1	100.0
1965/66-1969/70	17.5	7.4	27.1	30.9	7.9	90.2	6.4	1.2	9.8	100.0
<u>Barley production</u>										
1960/61-1964/65	75.3	1/	3.0	10.7	8.7	97.7	1/	1/	2.3	100.0
1965/66-1969/70	75.9	1/	2.9	10.3	9.0	98.1	1/	1/	1.9	100.0
<u>Barley area planted</u>										
1960/61-1964/65	57.8	1/	5.8	21.1	8.6	93.3	1/	1/	6.7	100.0
1965/66-1969/70	52.7	1/	7.5	23.9	8.1	92.2	1/	1/	7.8	100.0
<u>Oats production</u>										
1960/61-1964/65	93.6	1.4	.8	.8	3.1	99.7	1/	1/	.3	100.0
1965/66-1969/70	96.1	1.3	.4	.4	1.4	99.6	1/	1/	.4	100.0
<u>Oats area planted</u>										
1960/61-1964/65	80.0	6.1	3.0	5.0	3.9	98.0	1/	1/	2.0	100.0
1965/66-1969/70	76.0	9.1	4.1	4.7	3.6	97.5	1/	1/	2.5	100.0
<u>Rye production</u>										
1960/61-1964/65	53.0	3.0	1/	16.1	25.5	97.6	1/	1/	2.4	100.0
1965/66-1969/70	59.7	2.7	1/	9.7	25.2	97.3	1/	1/	2.7	100.0
<u>Rye area planted</u>										
1960/61-1964/65	30.6	.2	10.3	31.6	23.7	96.4	1/	1/	3.6	100.0
1965/66-1969/70	28.6	.1	9.8	31.6	27.4	97.5	1/	1/	2.5	100.0
<u>Beef cattle numbers</u>										
1960 census	40.3	7.9	13.4	14.2	4.5	80.3	2.5	1/	19.7	100.0
1965 survey	39.5	7.7	14.2	14.3	4.3	80.0	2.6	1/	20.0	100.0
1969 census	38.7	8.2	13.0	14.9	4.6	79.4	2.7	1/	20.6	100.0
<u>Hog numbers</u>										
1963 survey	28.0	2.3	23.9	28.3	2.6	85.1	3.0	1/	14.9	100.0
1969 census	27.0	1.8	26.0	32.1	2.7	89.6	2.9	1/	10.4	100.0
<u>Sheep numbers</u>										
1963 survey	40.6	4.2	.5	2.0	5.1	52.4	.2	1/	47.6	100.0
1969 census	36.5	4.6	.5	2.0	4.6	48.2	.4	1/	51.8	100.0

Sources: Computed from data in (2, 1959-70) and (37, 1969).

1/ Included in total other Provinces.

Appendix table 11.--Percent of major grain and oilseed crop area of total area planted to these crops in each Province,
1960/61-1964/65 and 1965/66-1969/70

Crop	Pampa Province					Other Provinces					Total	
	Buenos Aires	Entre Rios	Santa Fe	Cordoba	La Pampa	Total Pampa	Chaco	San Luis	Other	Provinces	other	country
						Percent-						
<u>Wheat</u>												
1960/61-1964/65	37.7	23.4	28.5	27.9	40.3	33.1	--	--	7.9	5.2	31.6	
1965/66-1969/70	43.1	24.4	25.2	23.5	40.8	34.4	--	--	13.8	8.8	32.7	
<u>Corn</u>												
1960/61-1964/65	12.1	28.4	28.5	20.9	5.3	17.4	86.9	94.7	46.9	62.3	20.0	
1965/66-1969/70	13.8	34.4	30.9	25.9	10.0	20.4	36.8	92.1	46.1	54.7	22.7	
<u>Sorghum</u>												
1960/61-1964/65	3.9	3.2	13.3	9.0	2.8	6.5	13.1	5.3	2.6	4.6	6.4	
1965/66-1969/70	4.0	9.2	17.6	15.3	8.0	9.3	63.2	7.9	5.1	14.3	9.7	
<u>Barley</u>												
1960/61-1964/65	8.6	--	2.3	6.7	6.8	6.3	--	--	11.5	7.5	6.4	
1964/65-1969/70	6.1	--	2.4	6.0	4.1	4.8	--	--	8.9	5.7	4.8	
<u>Oats</u>												
1960/61-1964/65	14.6	6.5	1.4	1.9	3.8	8.1	--	--	4.2	2.8	7.7	
1965/66-1969/70	11.1	7.1	1.7	1.5	2.3	6.4	--	--	3.5	2.3	6.1	
<u>Rye</u>												
1960/61-1964/65	10.0	.4	8.9	21.9	41.0	14.3	--	--	13.5	8.9	14.0	
1965/66-1969/70	8.3	.2	8.0	20.0	34.8	12.7	--	--	7.2	4.6	12.1	
<u>Flaxseed</u>												
1960/61-1964/65	4.6	36.4	10.1	6.1	--	7.9	--	--	1.7	1.1	7.5	
1965/66-1969/70	4.6	21.1	5.9	3.1	--	5.4	--	--	.9	.5	5.1	
<u>Sunflower seed</u>												
1960/61-1964/65	8.5	1.7	7.0	5.6	--	6.4	--	--	11.7	7.6	6.4	
1965/66-1969/70	9.0	3.6	8.3	4.8	--	6.6	--	--	14.5	9.3	6.8	
<u>Total acreage</u>												
1960/61-1964/65	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
1965/66-1969/70	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

-- means Negligible.

Source: (2, 1970).

Appendix table 12.--Argentine official grades for common and durum wheat

Grade	Condition and/or color of grain	Minimum natural weight	Maximum limit of foreign material and broken and damaged kernels excluding weevil-damaged kernels and weevil-eaten germ 1/	Heat-damaged, rye, durum, and taganrock	Total	Maximum limit of yellow berry grain	Maximum limit of smutty grain
		Kg./ha.	Percent				
	Condition		Common wheat				
1	Natural, sound, and dry	78.0	0.50	2.0	10.0	0.10	
2	do.	75.0	1.00	3.0	20.0	.20	
3	do.	72.0	1.50	4.5	30.0	.30	
4 2/	do.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Color		Durum wheat				
1	Superior	78.0	.50	3.0	5.0	.10	
2	Normal	75.0	1.00	4.0	10.0	.25	
3	Inferior	72.0	1.50	5.5	15.0	.30	
4 2/	--	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

1/ Wild oats, grains of other cereals, broken kernels, rye, and durum and taganrock wheat computed at 50 percent of their weight. For all grades there is a maximum limit of 5 percent of weevil-eaten germ and 8 sweetclover seeds for each 100 gr. of wheat. The maximum limit of weevil-damaged kernels is established according to season, the initial allowance being 0.5 percent. 2/ The National Grains Board can establish a grade 4 with specifications according to the season. For the 1968-69 season, a grade 4 was established with a minimum natural weight of 67 kg. per ha.

Sources: (61 and 38).

Appendix table 13.--Argentine grading specifications for corn and sorghum

Grain 1/	Destination	Moisture limit (percent of total contents)	Maximum limits (percent of total contents) 2/						
			Damaged grain	Other grain	Foreign material	Broken grain	Green grain	Smutty grain	Insect damage
			Percent						
Corn	Export (natural dried)	15.0	2.0	n.a.	1.0	5.0	0.5	n.a.	3.0
Corn-FAQ	Export (artificial dried)	14.0	2.0	n.a.	1.0	5.0	.5	n.a.	3.0
	Domestic	16.5	2.0	n.a.	1.0	5.0	.5	n.a.	3.0
Sorghum	Export	15.0	2.0	7	4.0	10.0	n.a.	.3	1.0
	Domestic	16.0	2.0	7	4.0	10.0	n.a.	.3	1.0

1/ There are no official grades of corn and sorghum. Corn is traded on FAQ (Fair Average Quality) basis and classed by type (flint or dent) and by color (red or yellow). 2/ Limits are subject to seasonal changes.

Sources: (61) and (38).

Appendix table 14.--Grain storage in Argentina, selected years 1954-69

Type and location	1954	1964	1965	1967	1969
	<u>1,000 metric tons</u>				
<u>Official</u>					
At ports:					
Elevators.	894	925	999	985	1,066
Underground silos. . . .		1,503	1,509	1,467	1,509
Farm-type silos.	--	--	190	195	157
Total bulk	894	2,428	2,698	2,647	2,732
Storage in bags.	896	664	705	541	411
Total.	1,790	3,092	3,403	3,188	3,143
In countryside:					
Elevators.	122	323	337	337	337
Underground silos. . . .	n.a.	601	671	671	671
Farm-type silos.	--	--	71	78	78
Total.	n.a.	924	1,079	1,086	1,086
Total official	n.a.	4,017	4,482	4,274	4,229
<u>Private</u>					
Private buyers (bulk) . . .	n.a.	n.a.	1,156	910	
Cooperatives (bulk)	n.a.	n.a.		845	2,315
Farm (bulk)	<u>1/100</u>	n.a.	<u>1/2,000</u>	<u>1/2,200</u>	2,350
Total private.	n.a.	n.a.	3,156	3,955	4,665
Country total.	n.a.	n.a.	7,638	8,229	8,894

-- means Negligible.

1/ Estimated in (58, Apr. 22, 1968).

Source: (61).

100

Source: (61).

Appendix table 16.--Deflated support prices for grains in Argentina in 1965 pesos,
1950/51-1969/70

Crop year	Wheat <u>1/</u>		Rye <u>3/</u>	Oats white <u>4/</u>	Barley <u>5/</u>		Corn		Grain sorghum <u>7/</u>
	Hard and semi-hard <u>2/</u>	Durum			Malt-ing	Feed	Flint <u>6/</u>		
	1965 pesos per 100 kgs.								
1950/51	690	690	532	482	532	502	724	none	
1951/52	599	599	493	458	519	479	704	none	
1952/53	831	831	698	648	714	656	748	none	
1953/54	763	763	641	595	656	603	687	none	
1954/55	693	693	583	541	596	548	624	none	
1955/56	764	819	546	617	600	551	710	none	
1956/57	688	780	550	601	550	509	917	none	
1957/58	693	763	416	426	416	385	693	381	
1958/59	687	687	412	395	481	447	756	326	
1959/60	862	862	488	531	546	503	661	445	
1960/61	966	927	618	644	644	605	747	464	
1961/62	861	871	486	496	507	476	665	446	
1962/63	1,019	1,035	637	589	669	621	748	589	
1963/64	1,074	1,062	687	612	687	637	725	562	
1964/65	780	780	550	490	550	510	580	490	
1965/66	663	673	451	418	492	451	599	410	
1966/67	789	802	535	481	575	535	652	501	
1967/68	888	900	600	552	660	624	735	558	
1968/69	903	917	584	567	694	639	736	584	
1969/70	742	742	480	457	571	525	605	397	

1/ For 1950/51-1958/59, price quoted for grade 2 bagged on wagon in Buenos Aires. For 1959/60 and thereafter, price quoted for grade 1 bulk on wagon in Buenos Aires. Grade 1 for durum wheat in all years. 2/ Semi-hard for 1950/51-1959/60; simple average of semi-hard for rest of period. 3/ No. 2, bulk on wagon in Port of Buenos Aires. 4/ No. 2 white, bulk on wagon in Port of Buenos Aires. 5/ No. 2, bulk on wagon in Port of Buenos Aires. 6/ Yellow and red, bulk on wagon in Port of Buenos Aires. 7/ Bulk on wagon in Port of Buenos Aires.

Sources: Computed from data in (61, 9, and 28) using the implicit GDP deflator given in Appendix table 17 to deflate the series.

Appendix table 18.--Export unit value for Argentine grains, f.o.b., in current and 1965 pesos

Year	Wheat		Rye		Oats	
	Current	1965	Current	1965	Current	1965
	pesos	pesos	pesos	pesos	pesos	pesos
	-Pesos per 100 kgs.-					
1949	45.43	n.a.	19.34	n.a.	21.41	n.a.
1950	27.46	847.53	20.26	625.31	24.16	745.68
1951	40.86	924.43	44.20	1,000.00	39.68	897.74
1952	47.11	829.40	59.60	1,049.30	42.91	755.46
1953	48.19	800.50	23.12	384.05	23.19	385.22
1954	34.89	532.67	18.77	286.56	18.87	288.09
1955	35.84	497.09	21.92	304.02	28.34	393.07
1956	91.83	1,002.51	86.70	946.51	85.38	932.10
1957	106.74	979.27	90.02	825.87	78.23	717.71
1958	165.44	1,147.30	95.05	659.15	93.99	651.80
1959	419.90	1,442.46	347.31	1,193.10	332.41	1,141.91
1960	474.54	1,362.84	363.93	1,045.18	443.14	1,272.66
1961	508.58	1,310.44	354.51	913.45	344.67	888.10
1962	616.97	1,250.19	505.65	1,024.62	428.67	868.63
1963	872.62	1,389.52	919.97	1,464.92	718.90	1,144.75
1964	907.54	1,133.86	748.19	934.77	597.11	746.01
1965	906.46	906.46	685.99	685.99	686.51	686.51
1966	1,030.87	845.46	770.36	631.81	927.82	760.94
1967	1,669.95	1,115.98	1,645.73	1,099.79	1,257.26	840.19
1968	2,008.93	1,204.68	1,705.14	1,022.51	1,442.42	864.97
1969	2,067.24	1,148.98	1,560.78	867.49	1,403.03	779.81
	Barley		Corn		Grain sorghum	
	Current	1965	Current	1965	Current	1965
	pesos	pesos	pesos	pesos	pesos	pesos
1949	25.67	n.a.	23.21	n.a.	n.a.	n.a.
1950	24.07	742.90	20.08	619.75	n.a.	n.a.
1951	47.59	1,076.70	47.73	1,079.86	n.a.	n.a.
1952	49.44	870.42	51.34	903.87	n.a.	n.a.
1953	28.54	474.09	34.70	576.41	n.a.	n.a.
1954	22.91	349.77	26.85	409.92	n.a.	n.a.
1955	28.04	388.90	32.20	446.60	n.a.	n.a.
1956	90.02	982.75	107.05	1,168.67	n.a.	n.a.
1957	87.29	800.83	110.88	1,017.25	n.a.	n.a.
1958	105.24	729.82	119.06	825.66	n.a.	n.a.
1959	373.40	1,282.72	347.03	1,192.13	n.a.	n.a.
1960	435.20	1,249.86	399.44	1,147.16	332.94	956.35
1961	415.02	1,069.36	395.31	1,018.58	302.43	778.15
1962	504.82	1,022.94	486.19	985.19	335.03	678.82
1963	819.86	1,305.51	714.25	1,137.34	565.75	901.27
1964	694.56	867.77	706.51	882.70	562.86	703.40
1965	782.22	782.22	906.75	906.75	635.83	636.00
1966	1,058.86	868.42	1,062.43	871.34	785.67	644.63
1967	1,893.37	1,265.28	1,650.05	1,102.68	1,374.37	918.20
1968	1,860.32	1,115.57	1,691.24	1,014.18	n.a.	n.a.
1969	1,590.75	884.14	1,692.85	940.89	n.a.	n.a.

Source: Unit values computed from (9) based on f.o.b. prices at all ports of embarkation except for sorghum, which was computed from (32).

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